SIEMENS

FUJI-Reader

SP

Service Manual

Machine Description

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English

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CR-IR347/CR-IR347P
Service Manual

Machine Description (MD)

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Control Sheet

Issue date	Revision number	Reason	Pages affected
10/20/2000	00	New release (FM2732)	All pages
05/15/2001	01	Corrections (FM3052)	MD - 6, 7, 22, 23, 25, 35, 37
08/30/2001	02	Support for “plus” (FM3142)	MD - 6, 7
08/30/2002	03	Explanation of software terminology and other information added (FM3476)	MD - 6–8, 17–51, 51.1–51.12

1. Machine Overview

1.1 Features

The CR-IR347 is an FCR image reader that supports high-quality mammography. It offers new functionality to provide high-quality mammography support while retaining the basic functions that are found in the CR-IR342 (FCR5000R).

■ Machine features

● Use of the dual-surface light-gathering technology

- The pixel density is increased from 10 pixels/mm (normal density) to 20 pixels/mm (50 μm pixels).
- The images on both the front and back IP surfaces are read and then the obtained image data are added up to achieve high resolution.

● Use of the double-sided HR-IP and its dedicated cassette

The CR-IR347 uses the double-sided HR-IP and its dedicated cassette. The double-sided HR-IP is specially designed for mammography.

◆ INSTRUCTIONS ◆

- *Do not use the double-sided HR-IP or its dedicated cassette with a reader other than the CR-IR347.*
- *When using the double-sided HR-IP, use its dedicated double-sided HR-IP cassette.*

- The following IP sizes are available:

  Double-sided HR-IP: 18 cm x 24 cm mammography and 24 cm x 30 cm mammography

  Single-sided ST-IP: All sizes of ST-VN and ST-VI
- A barcode label is attached to the double-sided HR-IP cassette for indicating the double-sided HR-IP type and size.
- To prevent the double-sided HR-IP surfaces from being scratched or soiled, a guide plate with a shock absorber is added to the areas with which the IP front surface comes into contact. Further, a shock absorber is attached to every guide plate that comes into contact with the IP back surface.

● Dusttightness

Since the CR-IR347 is designed for high resolution, its image quality is more easily affected by a small amount of dust than in the predecessors. To assure increased dusttightness, the following measures are taken:

- The cleaning guide mechanism specially designed for the double-sided HR-IP is added.
- A static eliminator brush is added to avoid electrostatic dust buildup.
- Inner covers are added to the right- and left-hand sides of the scanner unit.

● Image format additions for mammography

The following three mammography image formats are added:

- Single format
- AB (2-on-1) format
- ABCD (4-on-1) format

● Other

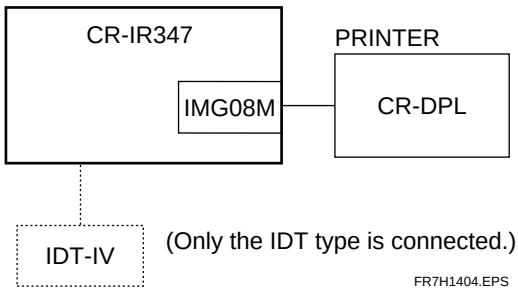
- A ground is added to avert the influence of static electricity on the image quality.
- The sensors emit light intermittently to prevent the IP from being fogged. In the side-positioning and other sequences where the IP is temporarily halted, the sensors are inhibited from emitting light.
- Differing image reading speeds are employed for the double-sided HR-IP and single-sided ST-IP. Therefore, the type of the subscanning motor (MZ1/FFM) is changed so as to provide three different conveyance speeds.
- Since the image data size is increased, additional memory is installed.

1.2 System Configuration

The CR-IR347 system can be configured in a certain number of ways. This section shows typical basic system configurations.

■ Connecting the system directly to the LP

As is the case with the CR-IR342 (FCR5000R), the CR-IR347 system can be directly connected to the LP.



◆ *NOTES* ◆

- *Make sure that the configuration setup and memory addition procedures are completed for the employed printer to support a pixel density of 20 pixels/mm.*
- *Ensure that the printer and IDT-IV software versions support the connection to the CR-IR347.*
- *Be sure that the configuration setup procedures are completed for the CR-IR347 and IDT-IV.*

● Software versions supporting the connection to the CR-IR347

- CR-DPL: B01
- IDT-IV: A10/B10

● CR-IR347 configuration setup

Check the mammography formats.

❍ PRINT (FILMFNT.CFG)

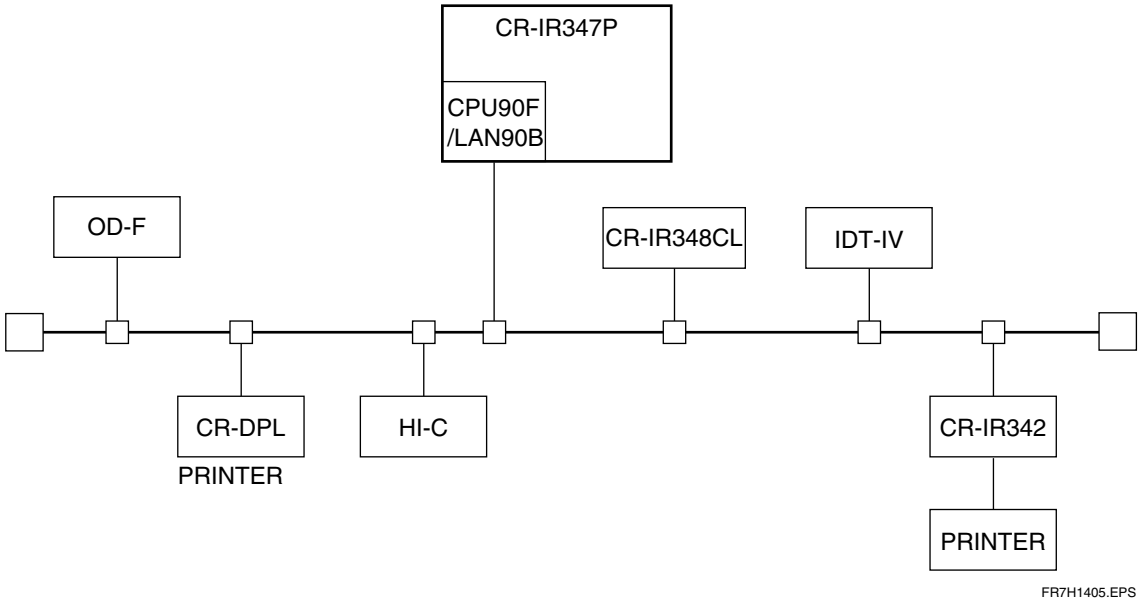
- 35.FD1824A
- 35.FD1824B
- 42.MBF
- 43.MFG1
- 44.MFG2
- 45.MFG3
- 46.MFR1
- 47.MFR2

● IDT-IV configuration setup

Change the added mammography menus (right-hand breast (DSR) and left-hand breast (DSR)) to the First Level.

■ Connecting the system to a network

A typical network-connected system is shown below:



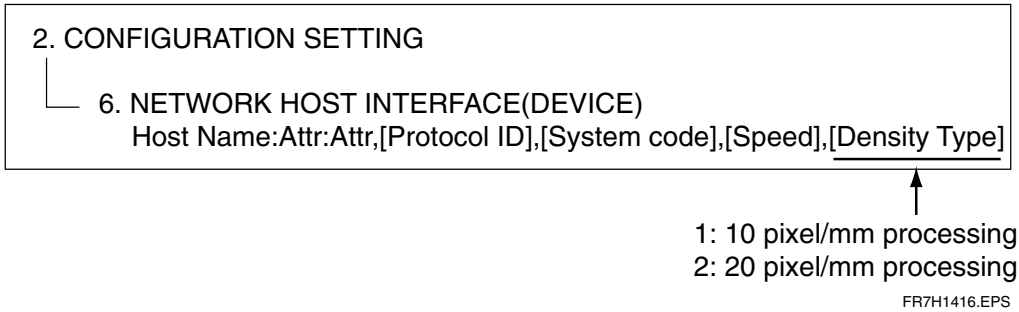
● IDT-IV configuration setup

Change the added mammography menus (right-hand breast (DSR) and left-hand breast (DSR)) to the First Level.

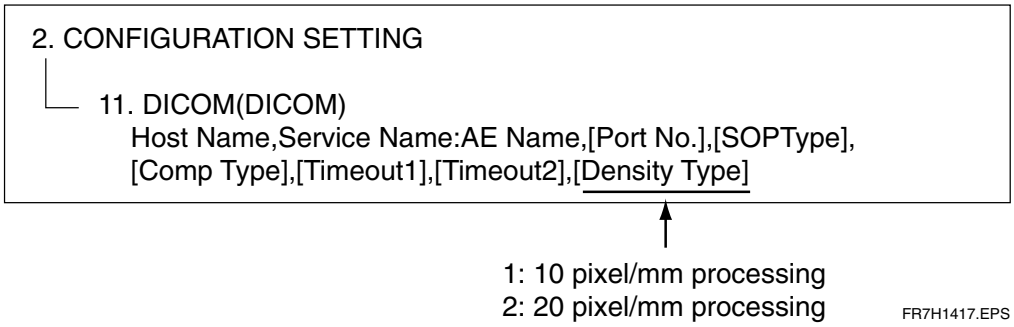
● Network connection configuration setup

❍ CR-IR347

- FINP110



- JQA-DICOM / OEM-DICOM



❍ HI-C655, HI-C655QA, HI-C654, OD-F614, OD-F624

Perform setup so as to permit the reception of high-resolution images.

● Software versions supporting the connection to the CR-IR347

❍ Direct connection (20 pixel/mm process)

- CR-DPL : B01

❍ FINP110 (20 pixel/mm process)

- HI-C655 : B00

❍ FINP110 (10 pixel/mm process)

- IDT-IV : A10 / B10
- 5000 : A10
- 5501H : A06
- 5502D : A01
- FN-PS551 : A04
- HI-C655QA (re-output) : A04
- OD-F614 : A11 / Z02
- DRYPIX1000 : A01
- CR-IR348CL : A02
- 5000R : A06
- 5501D : A02
- 5000MA : A02
- HI-C655 : A07
- HI-C654 : A13-03 β
- OD-F624 : A11 / Z02

◆ *NOTE* ◆

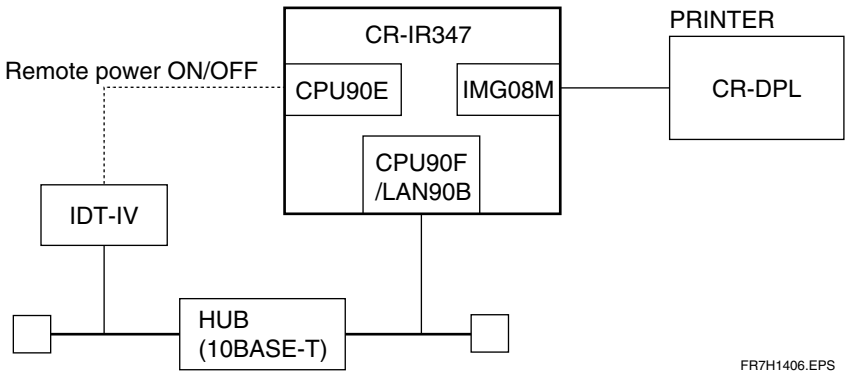
The HI-C654 does not support the mammography menus added to the CR-IR347.

❍ JQA-DICOM (10 pixel/mm process)

- HI-C655QA (storage): A04

■ Connecting only the IDT-IV to a network

The example below shows a configuration in which only the IDT-IV is connected to a network while the system is directly connected to the LP.



◆ *NOTES* ◆

- *Make sure that the configuration setup and memory addition procedures are completed for the employed printer to support a pixel density of 20 pixels/mm.*
- *Ensure that the printer and IDT-IV software versions support the connection to the CR-IR347.*
- *Be sure that the configuration setup procedures are completed for the CR-IR347 and IDT-IV.*

● Software versions supporting the connection to the CR-IR347

- CR-DPL: B01
- IDDT-IV: A10 / B10

● CR-IR347 configuration setup

Check the mammography formats.

❍ PRINT (FILMFNT.CFG)

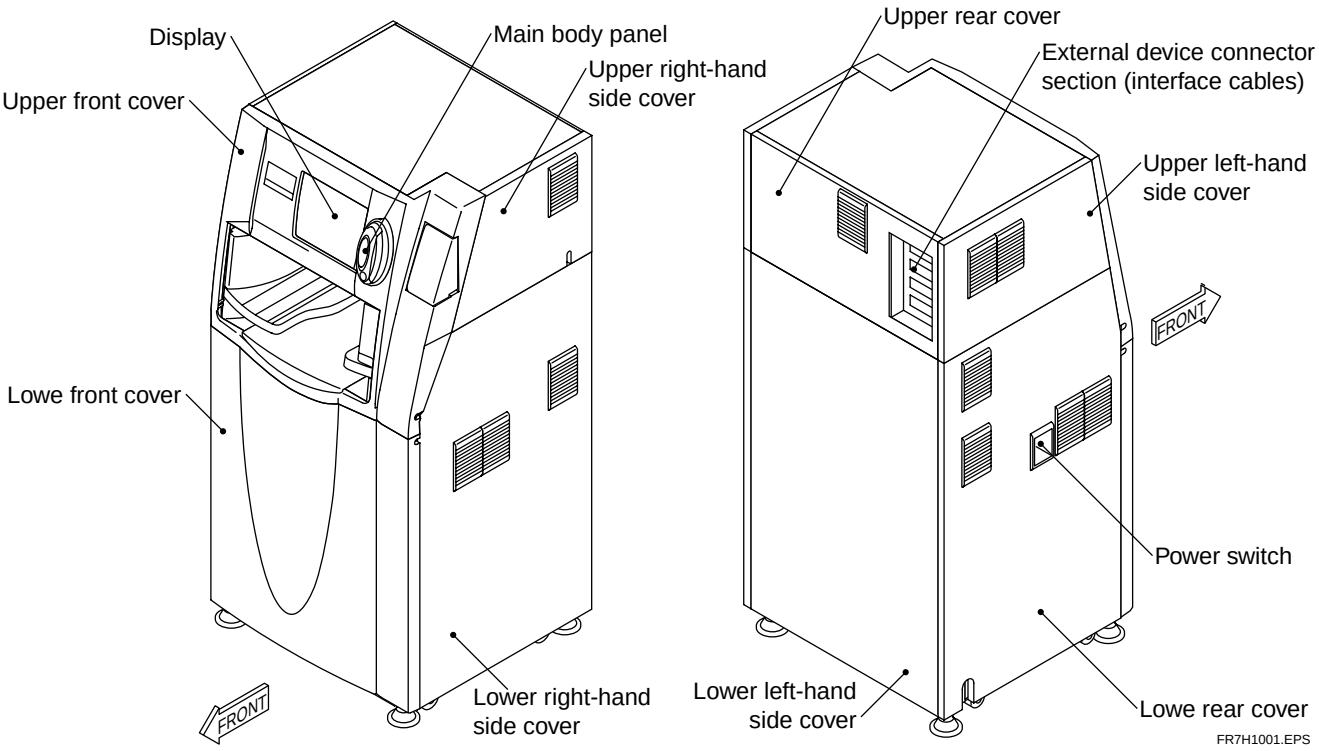
- 35.FD1824A
- 35.FD1824B
- 42.MBF
- 43.MFG1
- 44.MFG2
- 45.MFG3
- 46.MFR1
- 47.MFR2

● IDT-IV configuration setup

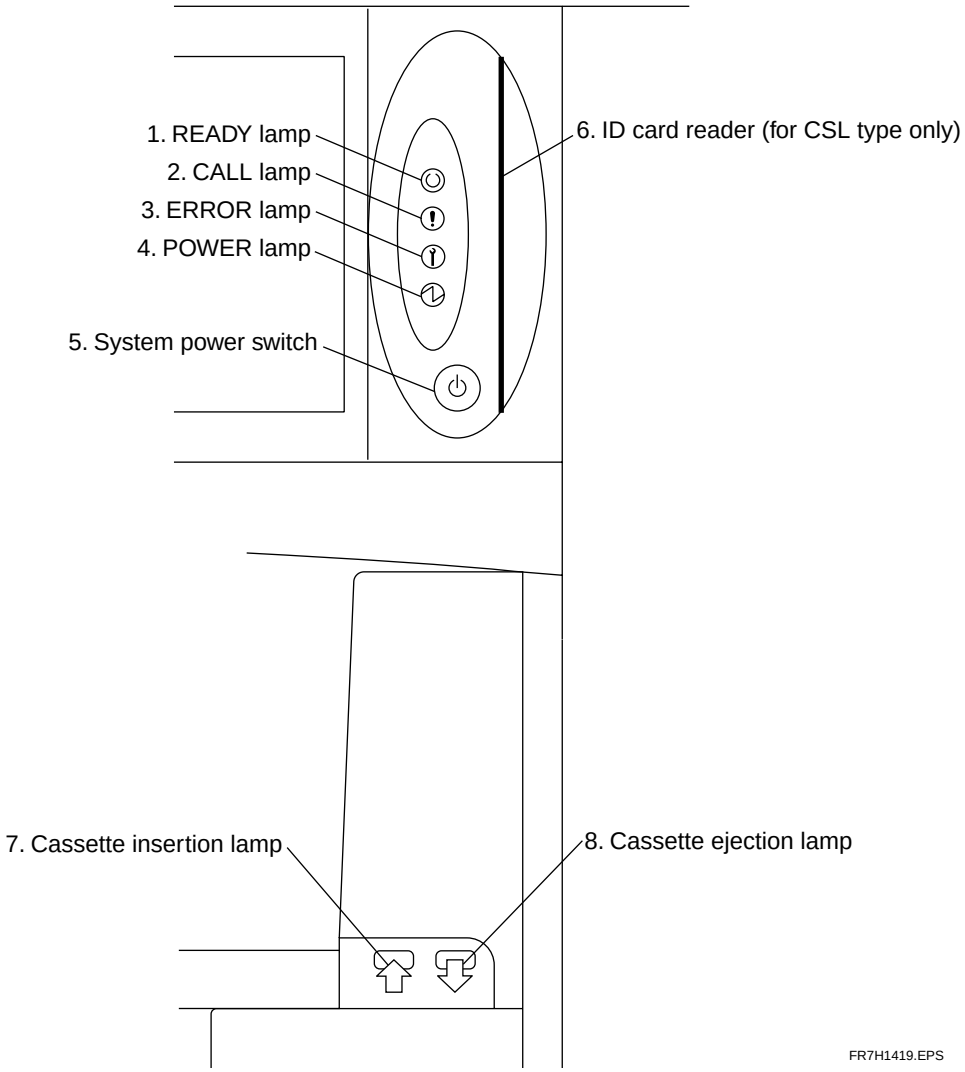
Change the added mammography menus (right-hand breast (DSR) and left-hand breast (DSR)) to the First Level.

1.3 External Machine Components and Their Names

■ Machine external views



■ Main body panel markings



No.	Name	Illumination	Function description
1	READY lamp	Glows green.	Glows when the machine starts up normally.
2	CALL lamp	Glows yellow.	When the CALL lamp comes on, the alarm buzzer sounds and the display opens a pop-up window. Proceed in compliance with the message (instructions) displayed within the window.
3	ERROR lamp	Glows orange.	When the ERROR lamp comes on, the alarm buzzer sounds and the display opens a pop-up window (serious error occurrence). Proceed in compliance with the message (instructions) displayed within the window.
4	POWER lamp	Glows green.	This lamp comes on when the power turns ON.
5	System power switch	–	When you press this switch with the power turned ON, the machine power turns ON.
6	ID card reader (for CSL type only)	–	Use the slot in this card reader to read a patient ID.
7	Cassette insertion lamp	Glows green.	This lamp comes on when the machine starts up normally. It also indicates that a cassette can be inserted into the machine.
8	Cassette ejection lamp	Glows green.	This lamp glows to indicate that a processed cassette can be ejected from the machine.

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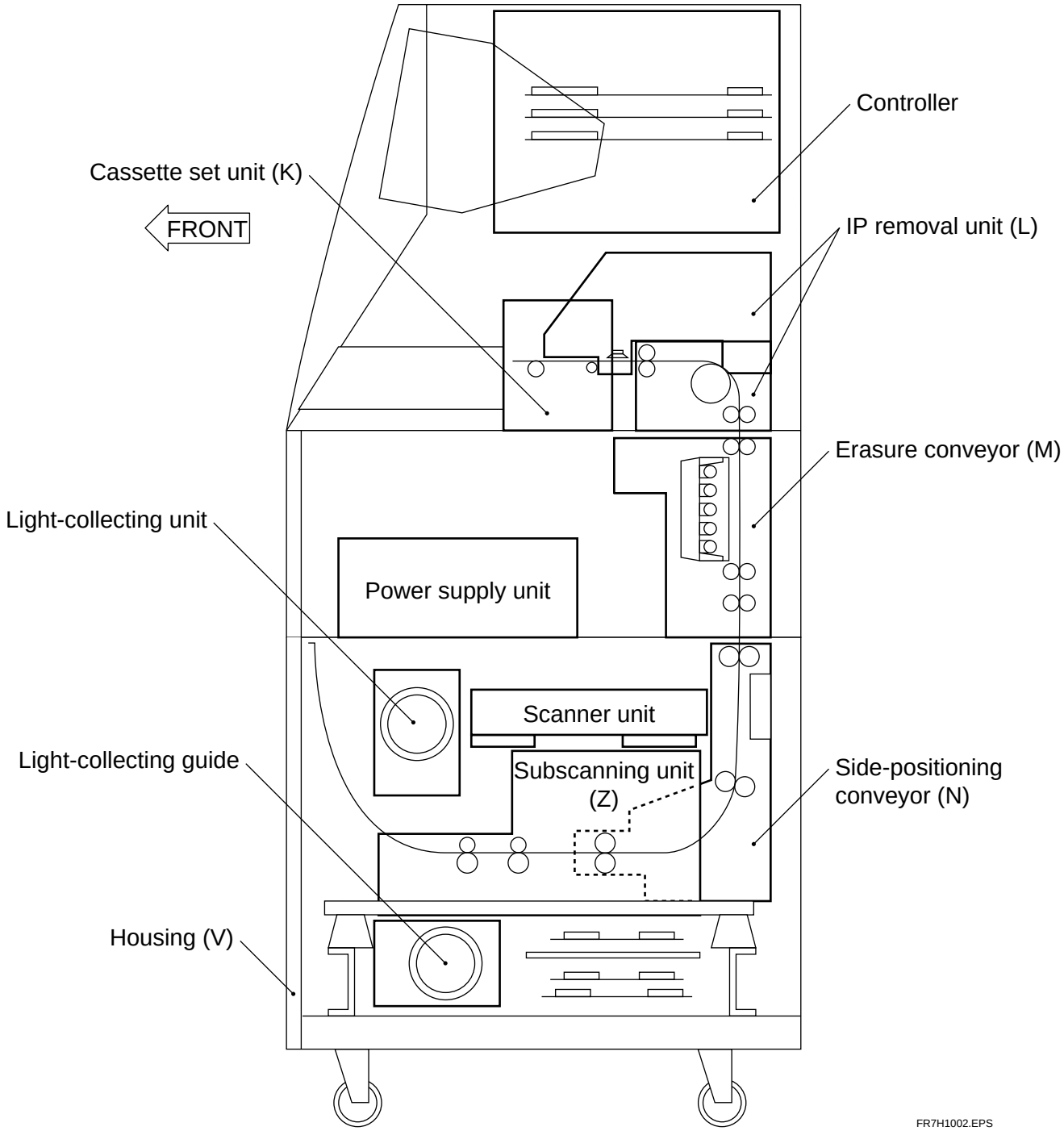
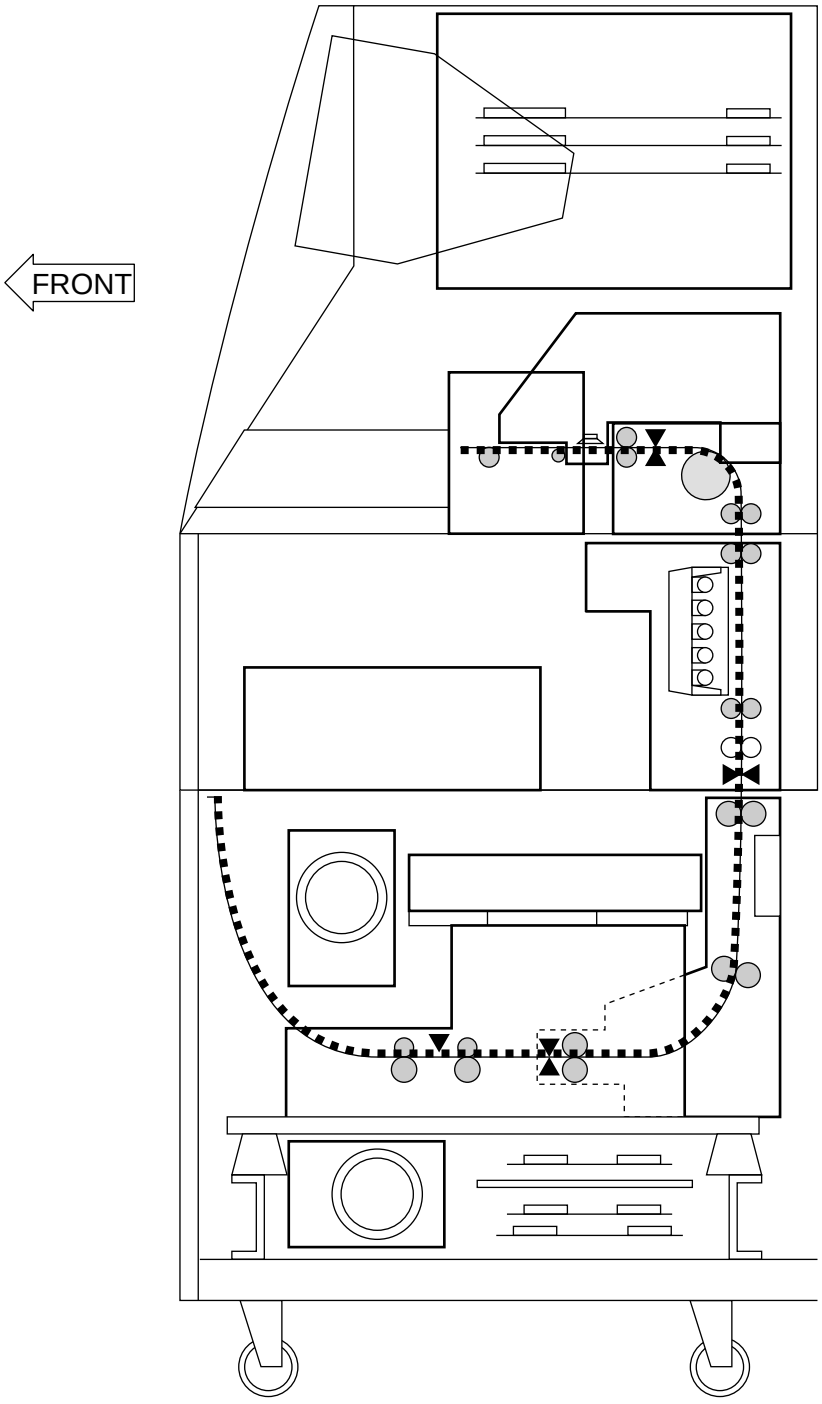
1.4 Internal Machine Components

1.4.1 Unit arrangement



1.4.2 Roller arrangement and conveyance path



: Rubber roller
: Conveyance path
: IP conveyance sensor

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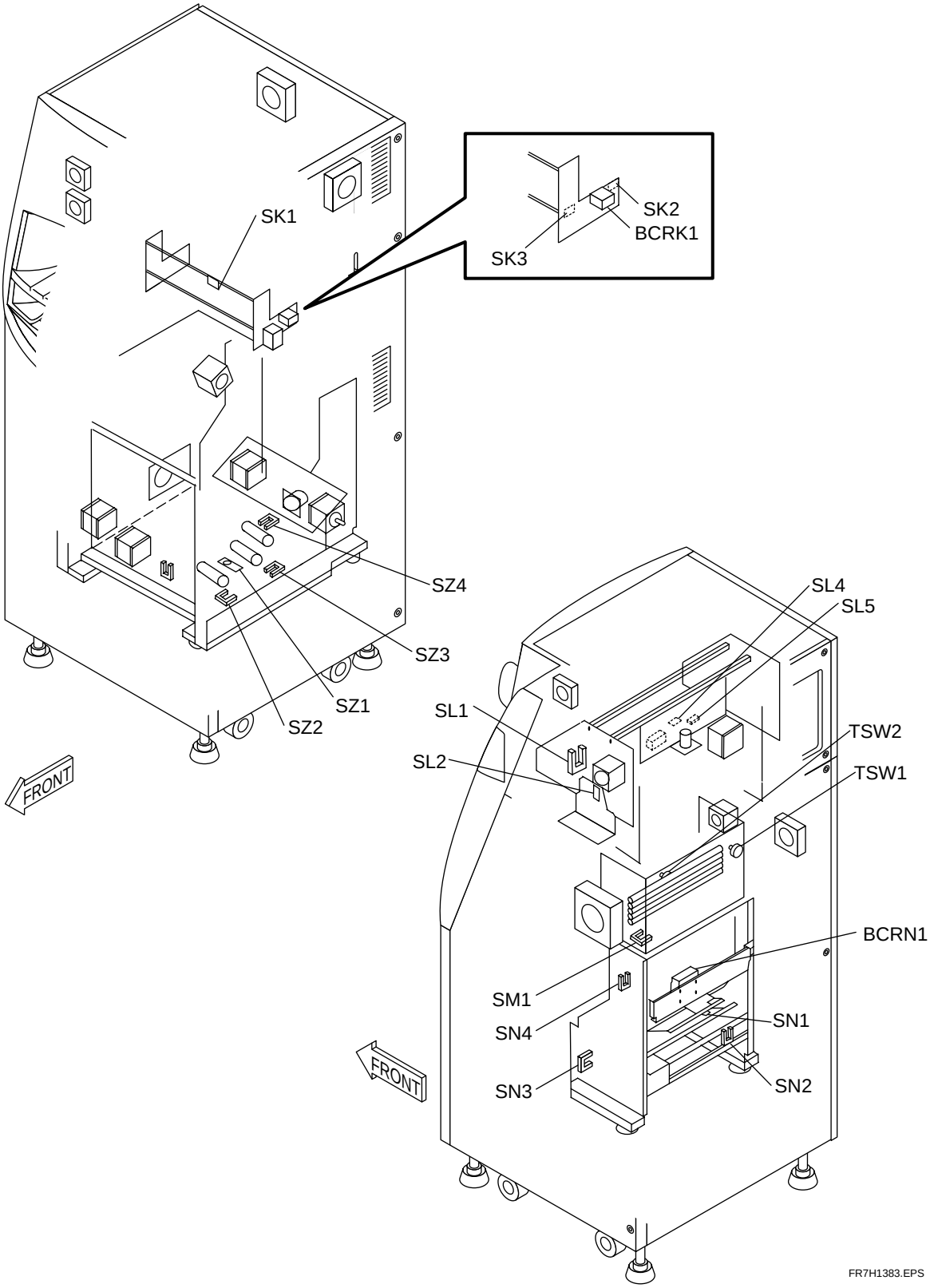
1.4.3 I/O arrangement diagram and function descriptions

■ I/O arrangement diagram (sensors and thermistors)



■ I/O list (sensors and thermistors)

Unit name (unit symbol)	Symbol	Name	Sensor closure definition	Type	Function/remarks
Cassette set unit (K)	SK1	Cassette ejection sensor	Light path blocked	PI (5 mm)	Actuates upon cassette ejection.
	SK2	Cassette insertion sensor	Cassette present	Microswitch	The state of this sensor is ANDed with that of the SK3 to achieve recognition.
	SK3	Cassette hold sensor	Light path blocked	PI (5 mm)	Actuates upon completion of a cassette hold operation.
	BCRK1	Barcode reader			Provides mammography cassette identification.
IP removal unit (L)	SL1	Suction cup HP sensor	Light path blocked	PI (5 mm)	
	SL2	Cassette opening IP sensor	IP present	PI (19 mm)	IP conveyance sensor
	SL4	Inch/metric sensor	Inch or large size	Reflection type	IP width determination
	SL5	Suction sensor	Suction cup assembly	Suction sensor	
Erasure conveyor (M)	SM1	Before-BCR IP sensor	IP present	PI (19 mm)	IP conveyance sensor
	LDSN1-5	Illumination failure sensor			
	TSW1	Erasure thermostatic switch (thermal switch)	–	–	Lamp house
	TSW2	Erasure thermostatic switch (temperature control switch)	–	–	Fan control
Side-positioning conveyor (N)	SN1	Side-positioning mechanism HP sensor	Light path blocked	PI (5 mm)	
	SN2	Grip release home position sensor	Light path blocked	PI (5 mm)	
	SN3	Side-positioning IP sensor	IP present	PI (19 mm)	IP conveyance sensor
	SN4	Cleaning guide HP sensor	Light path blocked	PI(5mm)	
	BCRN1	Barcode reader			
Subscanning unit (Z)	SZ1	IP leading edge sensor	IP present	Laser light receptor	IP conveyance sensor (SED08D)
	SZ2	Driving-end grip release HP sensor	Light path blocked	PI (5 mm)	
	SZ3	Driven-end grip release HP sensor	Light path blocked	PI (5 mm)	
	SZ4	Mirror HP sensor	Light path blocked	PI (5 mm)	

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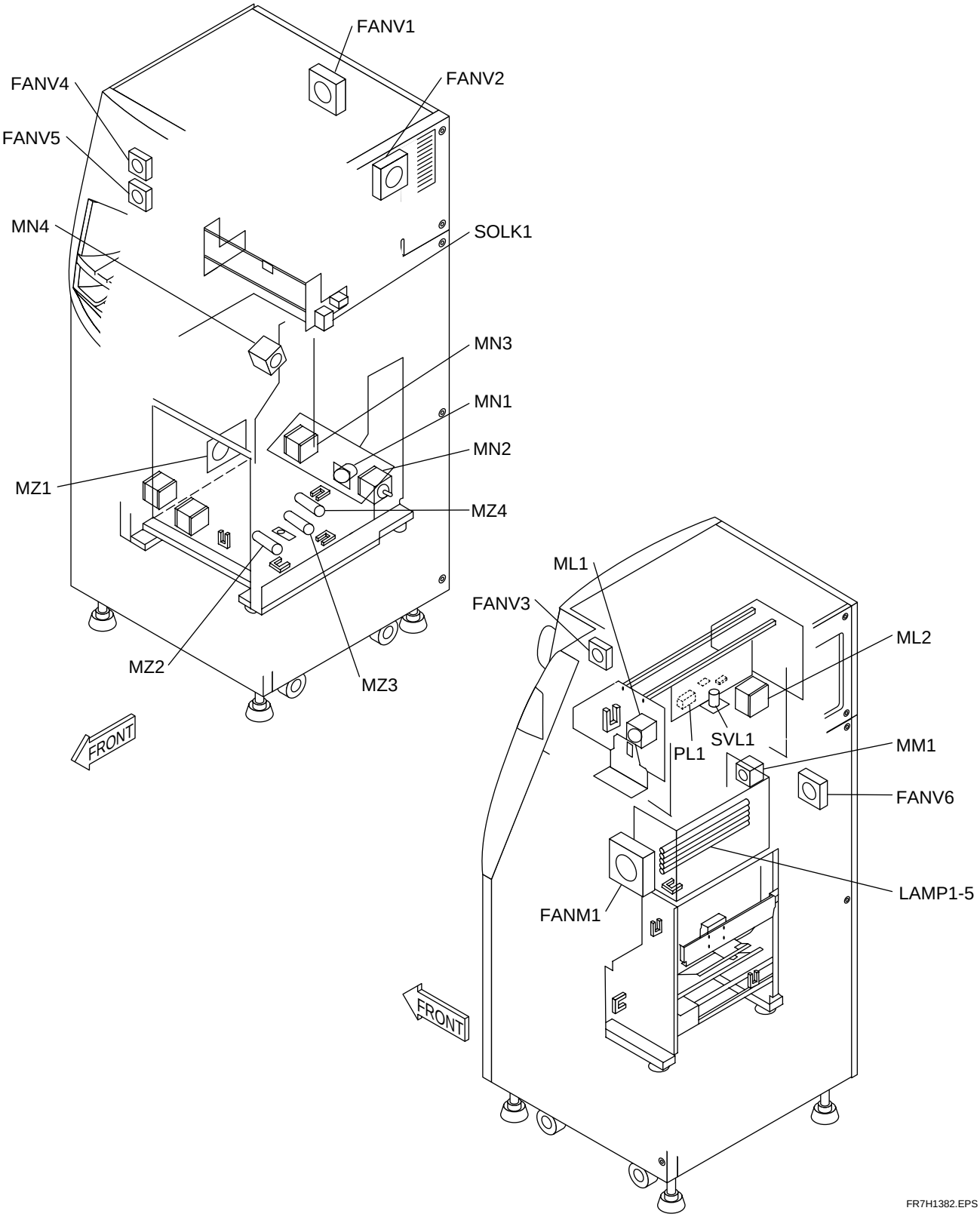
■ I/O arrangement diagram (motors, solenoid, pump, solenoid valve, erasure lamps, and fans)



■ I/O list (motors, solenoid, pump, solenoid valve, erasure lamps, and fans)

Unit name (unit symbol)	Symbol	Name	Type	Function/remarks
Cassette set unit (K)	SOLK1	Cassette hold solenoid	Power down solenoid	When turned ON, this solenoid retracts the cassette hold pin.
IP removal unit (L)	ML1	Suction cup driving motor	Pulse motor	Opens the cassette rear cover and moves a roller.
	ML2	IP transport motor	Pulse motor	Conveys the IP.
	PL1	IP suction pump	DC pump	When turned ON, this pump provides suction.
	SVL1	IP leak valve	Solenoid valve	When turned ON, this valve provides suction relief.
Erasure conveyor (M)	MM1	IP conveyance motor	Pulse motor	Conveys the IP.
	LAMP1-5	Erasure lamps	Fluorescent lamps	Erasure light source
	FANM1	Erasure cooling fan	DC fan	
Side-positioning conveyor (N)	MN1	Side-positioning motor	Pulse motor	Drives the side-positioning mechanism.
	MN2	Grip release motor	Pulse motor	Grips/releases a roller.
	MN3	IP transport motor	Pulse motor	Conveys the IP.
	MN4	Cleaning guide drive motor	Pulse motor	Grips/releases the cleaning guide.
Subscanning unit (Z)	MZ1	Subscanning motor	FFM9	Conveys the IP.
	MZ2	Driving shaft grip motor	DC motor	Grips/releases the driving shaft.
	MZ3	Driven shaft grip motor	DC motor	Grips/releases the driven shaft.
	MZ4	Mirror driving motor	DC motor	Moves the mirror up and down.
Housing (V)	FANV1	PC board cooling fan	DC fan	Cools the DRV08A board.
	FANV2	PC board cooling fan	DC fan	Cools the DRV08A board.
	FANV3	PC board cooling fan	DC fan	Cools the DRV08A board.
	FANV4	PC board cooling fan	DC fan	Cool the MTH08C/D and HDD.
	FANV5	PC board cooling fan	DC fan	Cool the MTH08C/D and HDD.
	FANV6	Machine interior pressurization fan	DC fan	Applies pressure to the inside of the machine.

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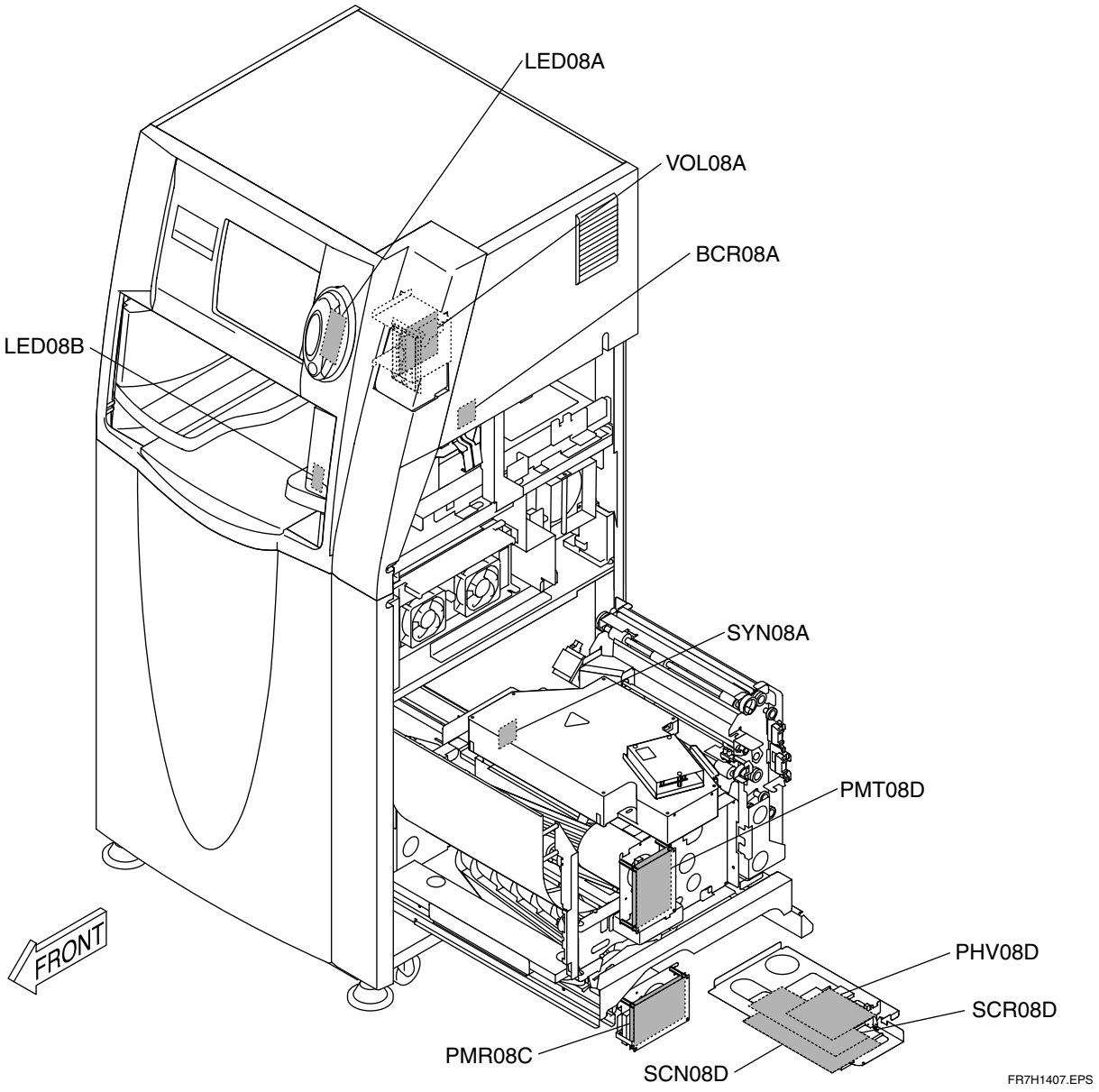
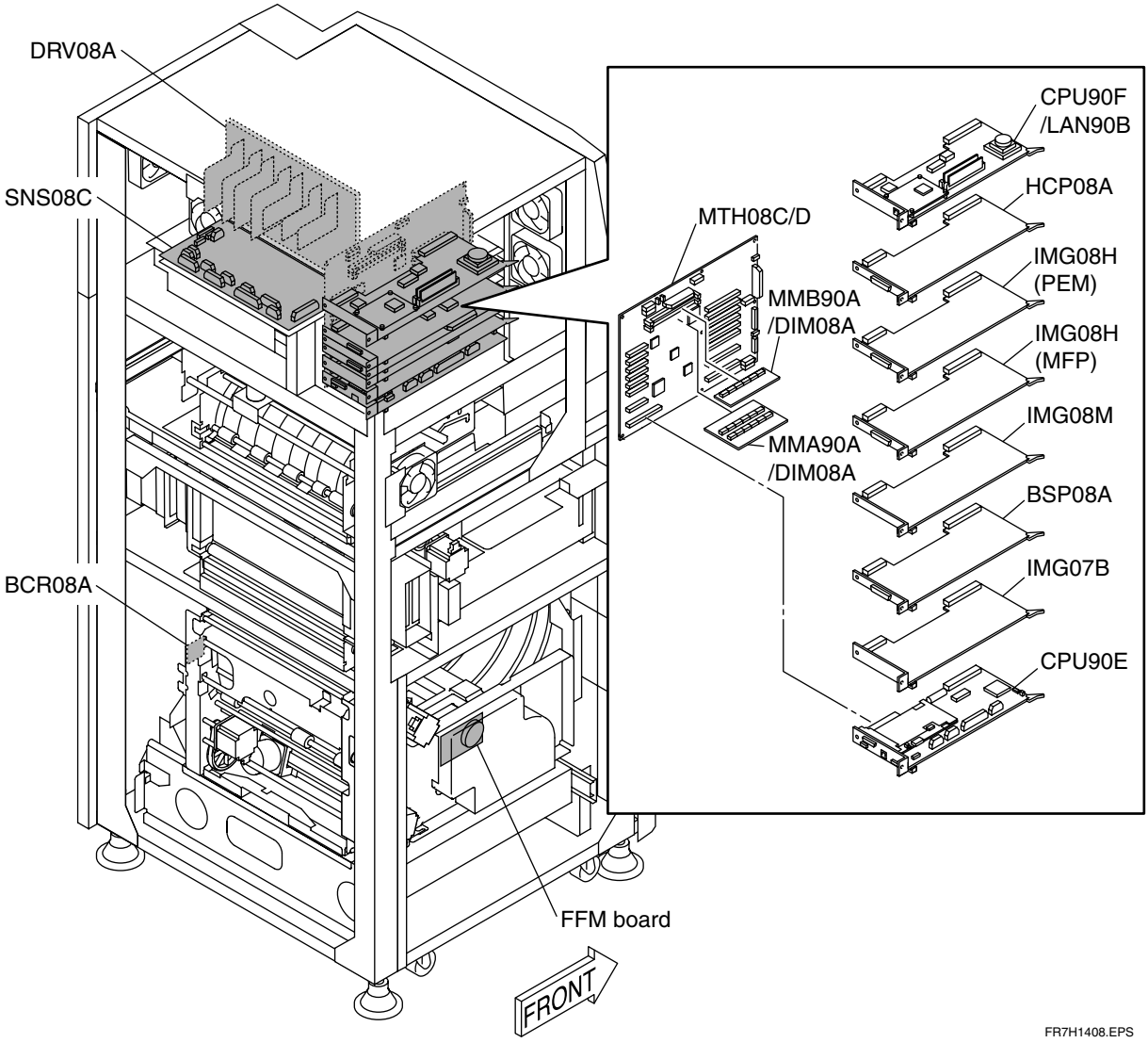
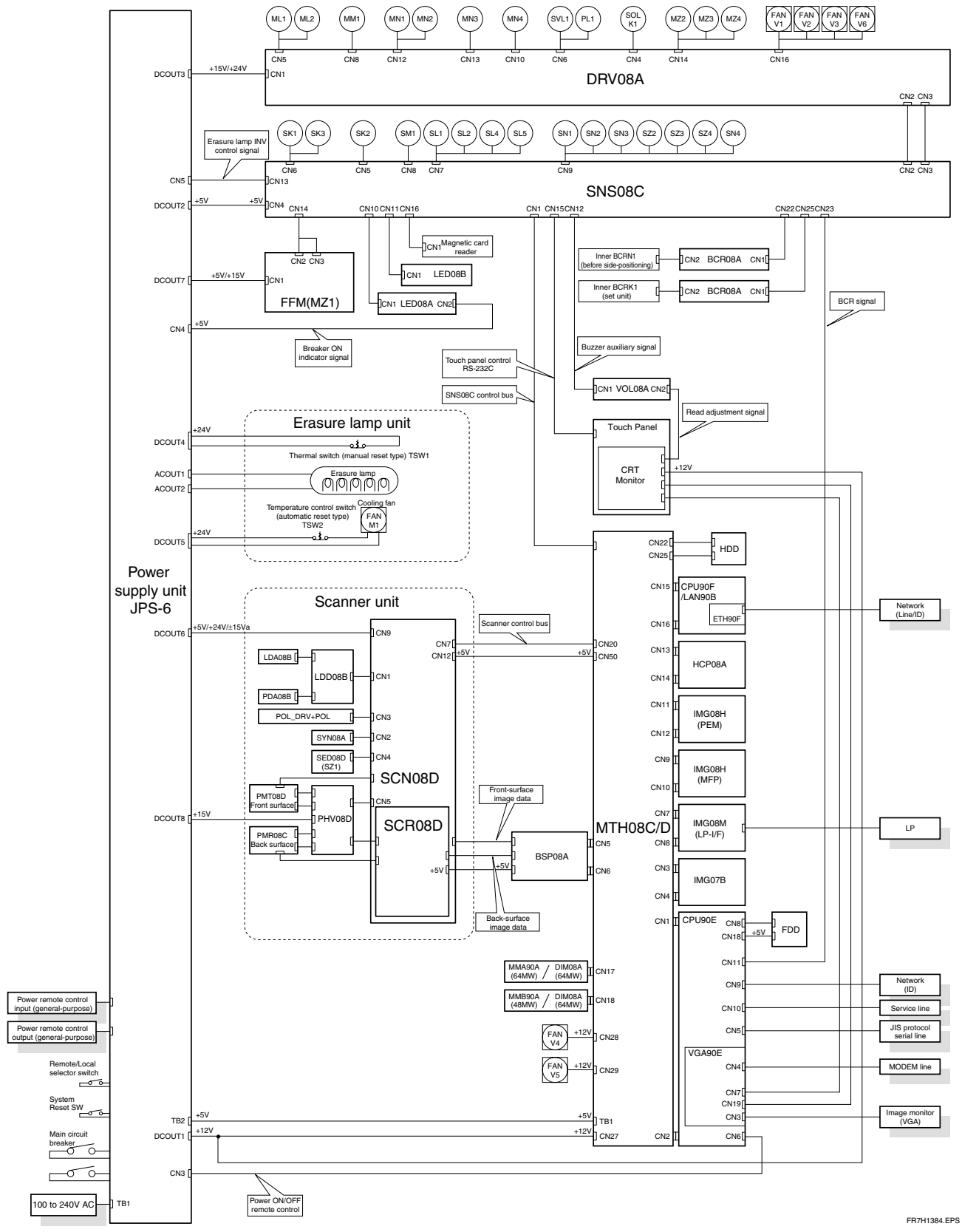
1.4.4 PC board arrangement diagram




DRV08A
SNS08C
BCR08A
FFM board
FRONT
CPU90F
/LAN90B
HCP08A
MTH08C/D
IMG08H
(PEM)
MMB90A
/DIM08A
IMG08H
(MFP)
IMG08M
MMA90A
/DIM08A
BSP08A
IMG07B
CPU90E
FR7H1408.EPS

1.5 System Block Diagram



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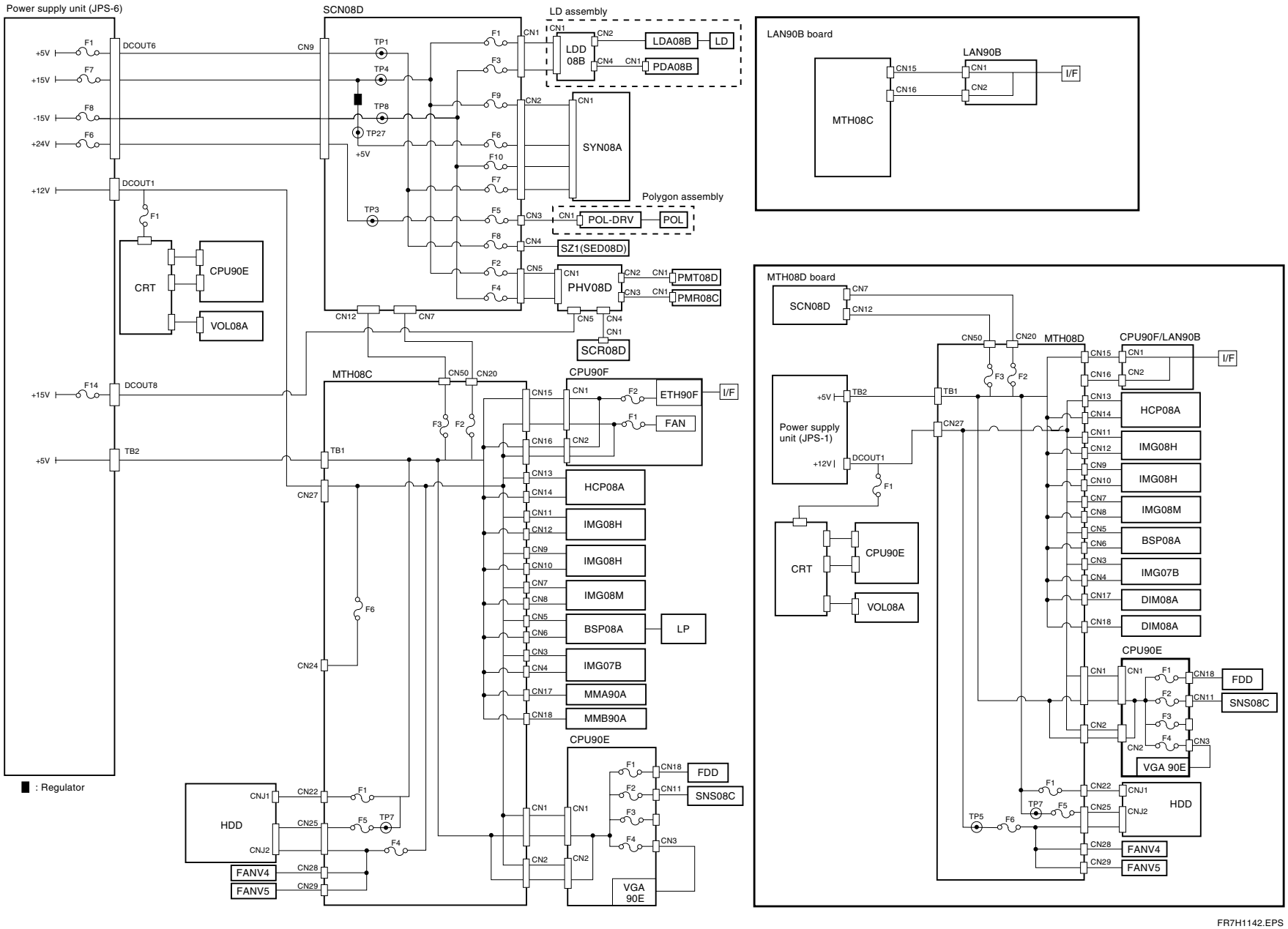
1.6 Power Supply Related Fuse Block Diagram



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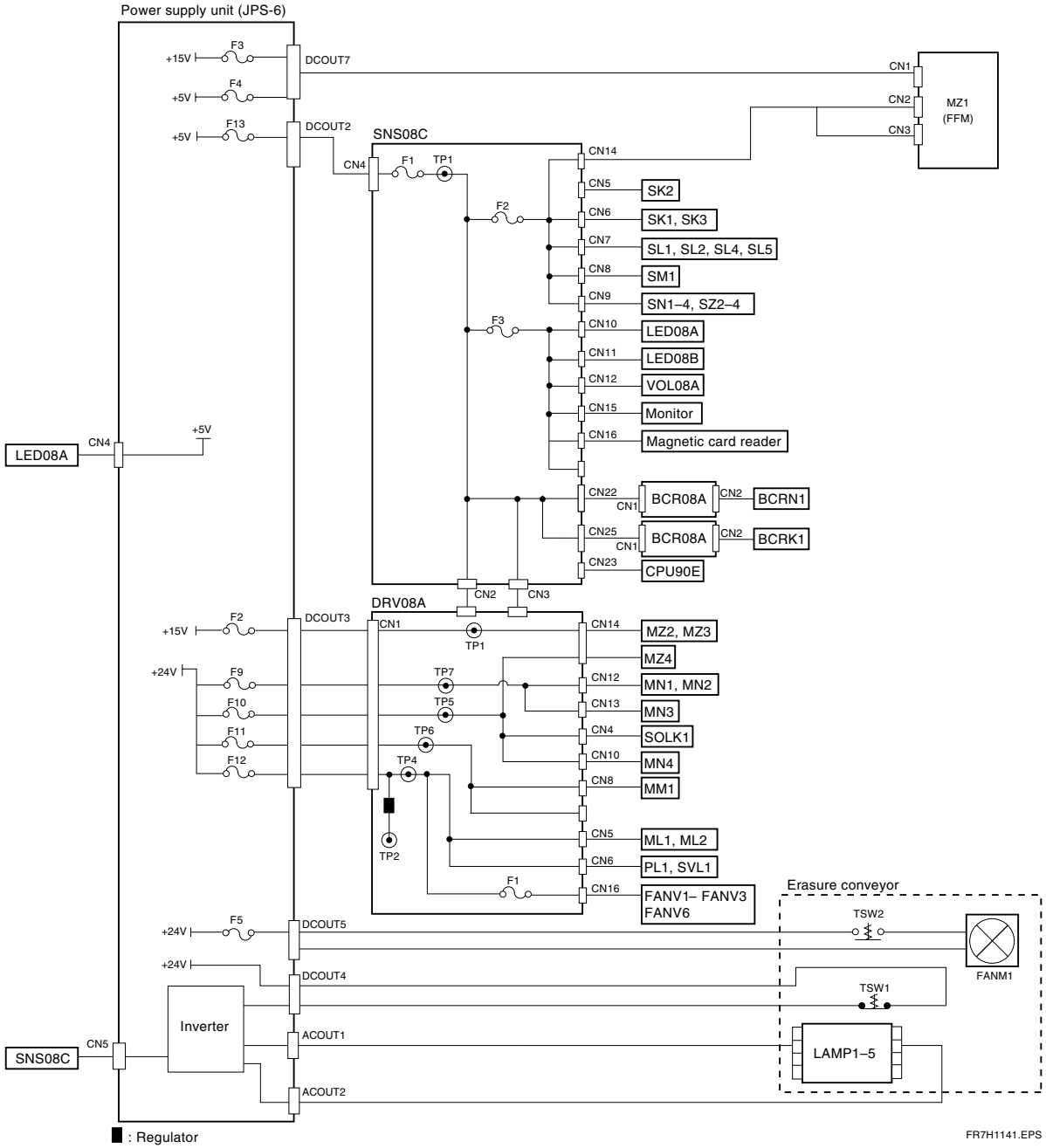
Power supply unit (JPS-6)
+15V
F3
DCOUT7
+5V
F4
+5V
F13
DCOUT2
CN1
CN2
CN3
MZ1
(FFM)
SNS08C
CN4
F1
TP1
CN14
CN5
SK2
F2
CN6
SK1, SK3
CN7
SL1, SL2, SL4, SL5
CN8
SM1
CN9
SN1–4, SZ2–4
F3
CN10
LED08A
CN11
LED08B
CN12
VOL08A
CN15
Monitor
CN16
Magnetic card reader
LED08A
CN4
+5V
CN22
CN1
BCR08A
CN2
BCRN1
CN25
CN1
BCR08A
CN2
BCRK1
CN23
CPU90E
CN2
CN3
DRV08A
+15V
F2
DCOUT3
CN1
TP1
CN14
MZ2, MZ3
MZ4
+24V
F9
TP7
CN12
MN1, MN2
F10
TP5
CN13
MN3
F11
TP6
CN4
SOLK1
F12
TP4
CN10
MN4
CN8
MM1
TP2
CN5
ML1, ML2
CN6
PL1, SVL1
F1
CN16
FANV1– FANV3
FANV6
Erasure conveyor
+24V
F5
DCOUT5
TSW2
FANM1
+24V
DCOUT4
TSW1
Inverter
SNS08C
CN5
ACOUT1
LAMP1–5
ACOUT2
: Regulator
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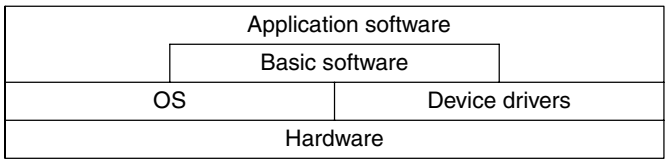
2. Software

2.1 Software Terms and Definitions

■ Basic Structure

The basic structure consists of the “OS”, “basic software”, “application software”, “device drivers”, and “hardware”.



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● OS

VxWorks

● Basic software

Software offering the functions that are commonly used by the application software.

Basic software	ISC	Inter-subsystem communication management	
	SED	Subsystem status/external event processing mechanism	
	Management system	IMM	Image data/ID information management control
		QUM	Processing request (queue) management control for image input/output subsystems
		CDM	Shared data (information about machine setup and external device connection setup) management control
		IDM	Image information (parameter) management control

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● Application software

Control application software.

● Device drivers

Software offered for device access common procedures

SIO	: Driver for serial transmission/reception
SCSI	: Driver for SCSI interface control
FDC	: Driver for floppy disk control
Ethernet	: Driver for network interface control
DMA	: Driver for overall DMA control
DSP	: Driver for image processing board (DSP) control
SCN	: Driver for processing an interrupt notification from the scanner board
Video	: Monitor system control driver
Sensor	: Driver for sensor status change (ON/OFF detection) notification
FPMC	: Pulse motor system control driver
Timer	: System clock system control driver (CPU clock incorporation into the OS)
SMCU	: IDT/DMS/LP (E interface) communication protocol
Polling	: Driver for transmission/processing request confirmation during each communication
Keyboard	: Driver for keyboard control
IOT	: Driver for performing a sensor status trace
LAN	: Driver for network board DMA control
Touch panel	: Driver for touch panel control
Card	: Driver for magnetic card reader control

● Hardware

PC boards

■ Subsystems

Divisions of the entire software system that are defined according to functionality and processing type

MFC : Exercises primary control over the system's startup, initialization, and shutdown processes and mode management.

PNL : Exercises panel control over M-Utility, U-Utility, and window display/reception.

IMG : Exercises image input control of the IMG07B board/scanner board.

CSL : Exercises ID input control over ID information processing (CSL type).

LIF : Exercises interface control over the IMG08A/B/C/H board.

FOT : Controls FINP output image data.

JNL : Controls an error logging process.

IPH : Provides IP conveyance control and IP mechanism control (subscanning included).

IIF : Exercises interface control over IDT communications.

DST : Provides image data flow control.

DIF : Exercises interface control of the DMC08A board.

FIN : Exercises FINP input image data control of the network boards (CPU90F, LAN, and HCP).

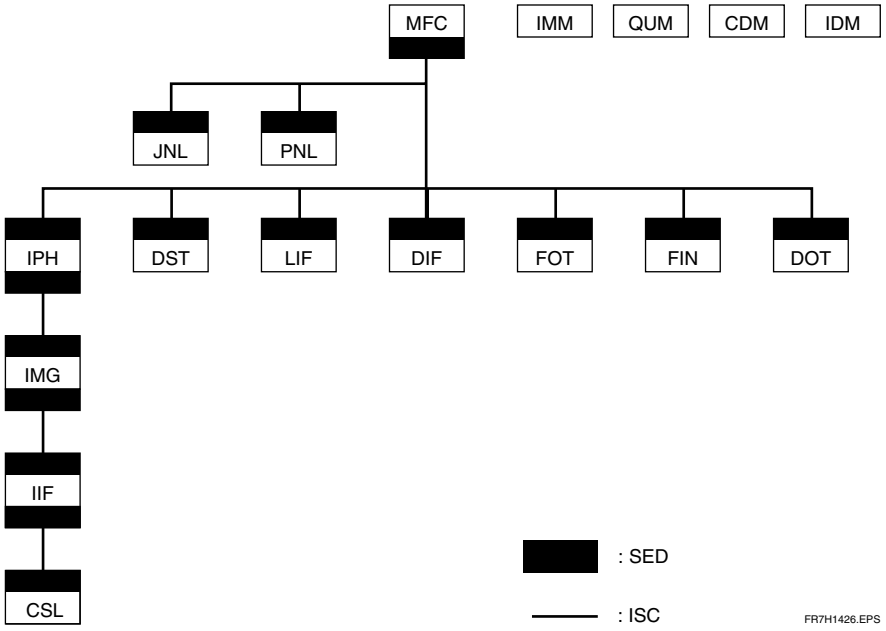
DOT : Exercises DICOM output control of the network.

● Subsystem connections

The subsystems are interconnected by a software bus, which consists of the subsystems, SEDs, and ISCs.

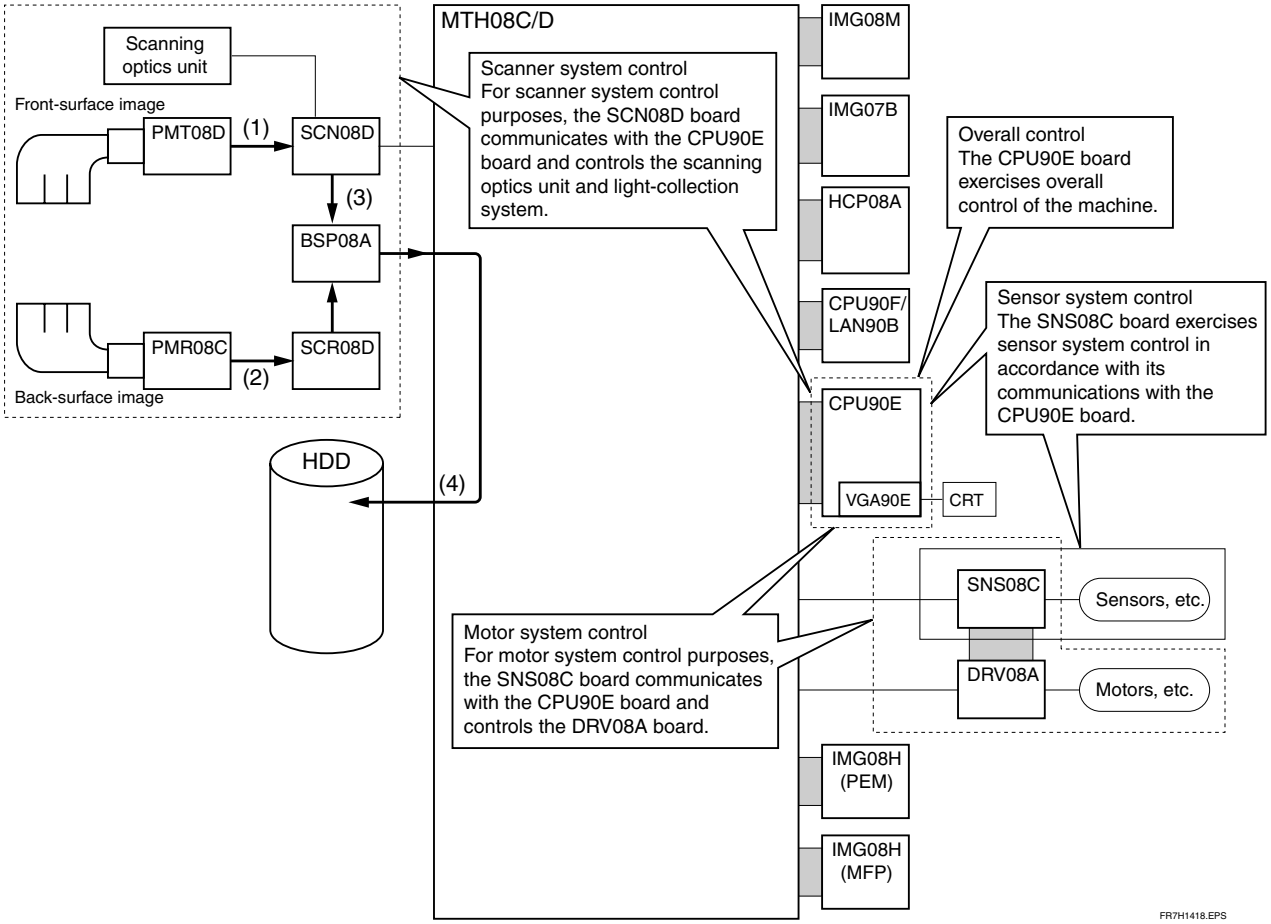
SED : Processes the messages (events) from the remote subsystems and the state of the local subsystem.

ISC : Manages message exchanges between the subsystems.



2.2 Image Data Flow (1)

A flow until the image data read is saved to the HDD is described.



■ IP read process

(1) The SCN08D board reads the front-surface image via the PMT08D board.

(2) The SCR08D board reads the back-surface image via the PMR08C board.

(3) The BSP08A board adds up the front- and back-surface images (HR imaging).

(4) The image data is saved to the HDD.

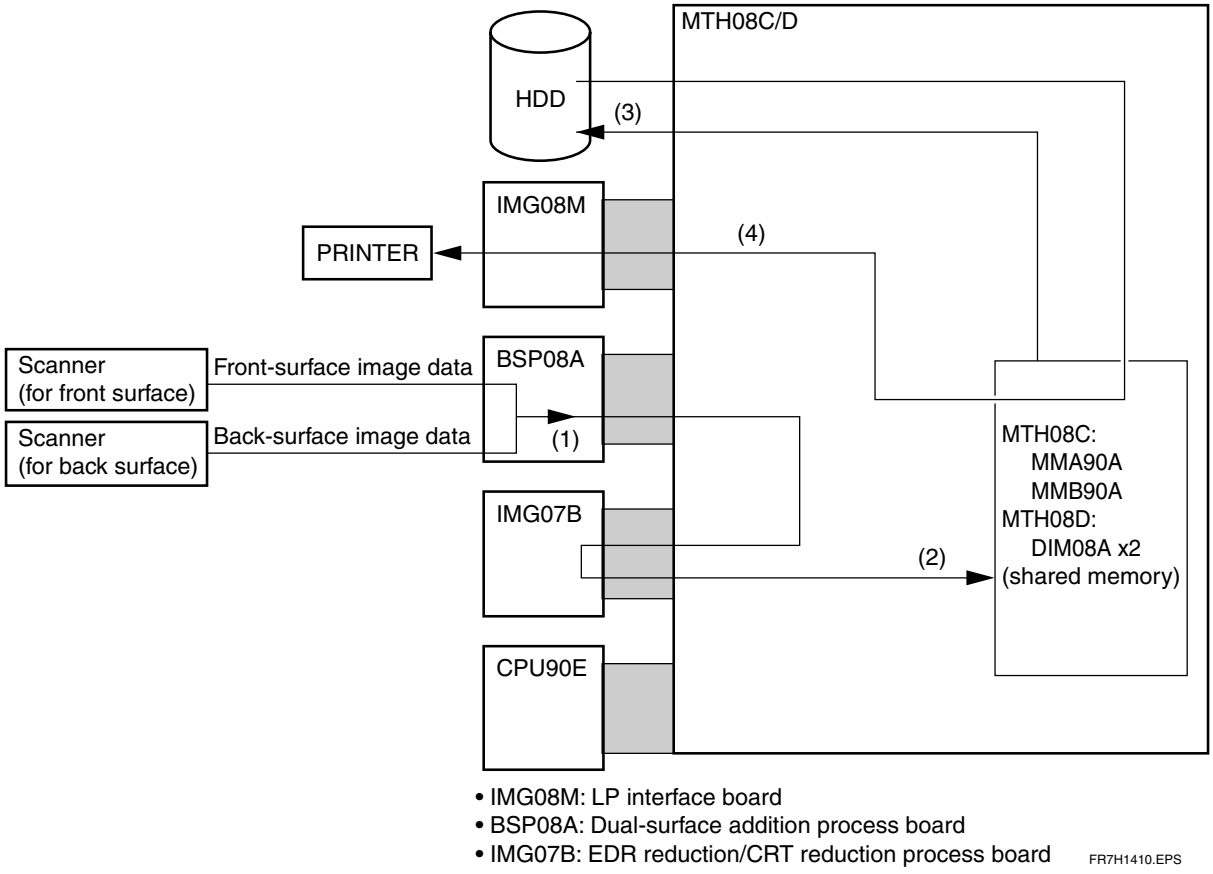
■ PC board function overview

CPU90E board	: Overall control board
MTH08C/D board	: Motherboard
IMG07B board	: CRT image/EDR image reduction board
IMG08M board	: Printer interface board
HCP08A board	: Image data compression board
VGA90E board	: CRT board
CPU90F/ LAN90B board	: Network board
SNS08C board	: Sensor/drive system control board
DRV08A board	: Drive system drive board
PMT08D board	: Front-surface image photomultiplier board
PMR08C board	: Back-surface image photomultiplier board
PHV08D board	: Front-/back-surface image logarithmic amplifier board
SCN08D board	: Scanner control/front-surface image board
SCR08D board	: Back-surface image board
BSP08A board	: Dual-surface image addition board
IMG08H board	: High-speed multi-objective frequency processing (MFP)
	: High-speed pattern enhancement processing for mammography (PEM)

2.3 Image Data Flow (2)

A flow until the image data in the HDD is outputted in various ways is described.

■ For a directly connected system



(1) The BSP08A board receives front- and back-surface image data from the scanner unit and adds them up.

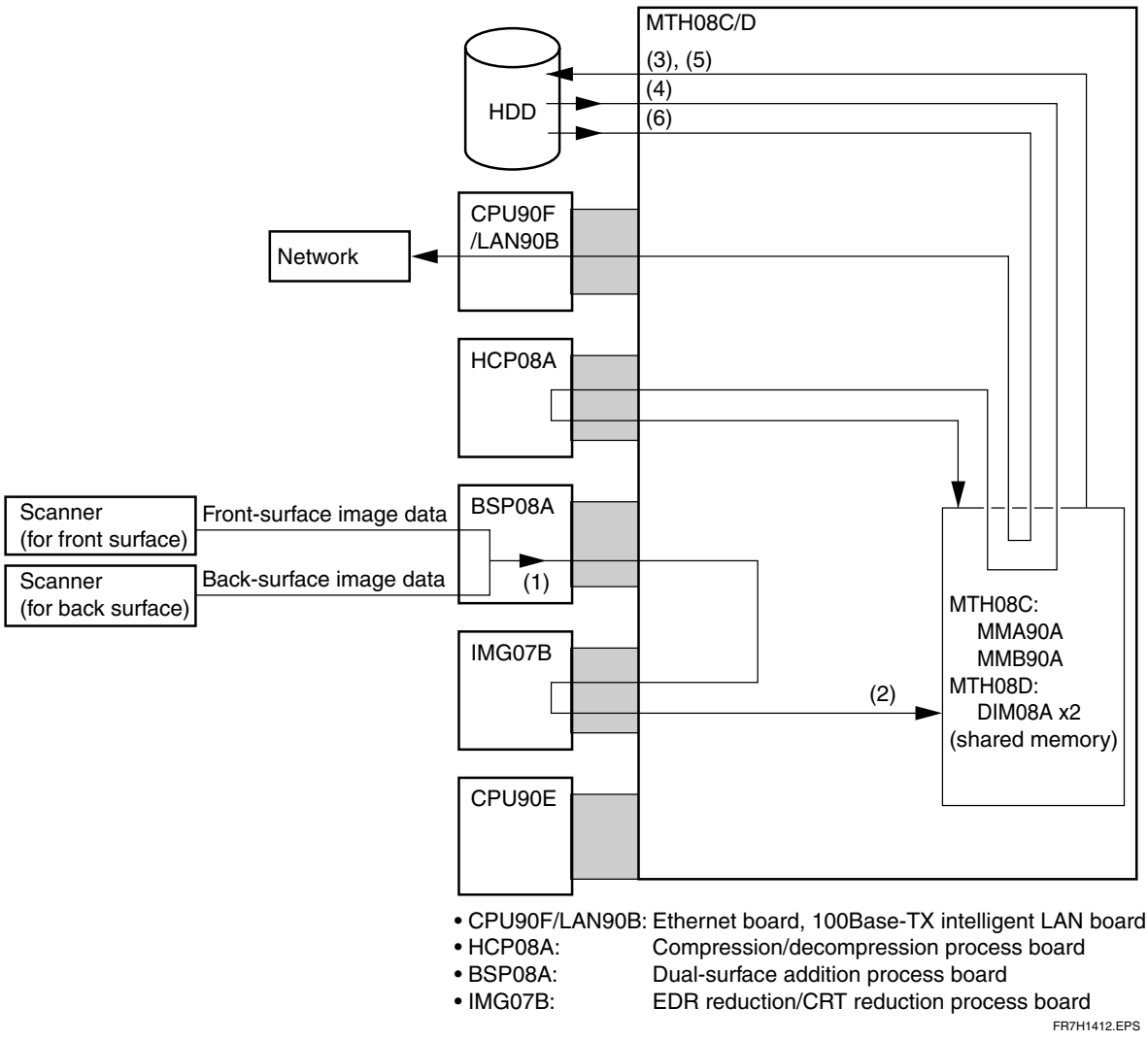
(2) The image data derived from addition is subjected to EDR reduction and CRT image reduction processes on the IMG07B board and written into the shared memory.

(3) The image data in the shared memory is saved onto the hard disk drive.

(4) The image data on the hard disk drive is delivered to the IMG08M board and subjected to image processing. The processed image data is then output to the printer.

- As regards HR imaging, the IMG08M board prints 20 pixel/mm image data onto the printer upon receipt of a signal indicating that the printer is ready to print 20 pixel/mm image data.
- When the printer signals that it cannot print 20 pixel/mm HR image data, the IMG08M board converts 20 pixel/mm image data to 10 pixel/mm equivalent and then prints the converted data onto the printer.
- For ST imaging, the IMG08M board prints 10 pixel/mm image data onto the printer without converting it.

■ For a networked system



(1) The BSP08A board receives front- and back-surface image data from the scanner unit and adds them up.

(2) The image data derived from addition is subjected to EDR reduction and CRT image reduction processes on the IMG07B board and written into the shared memory.

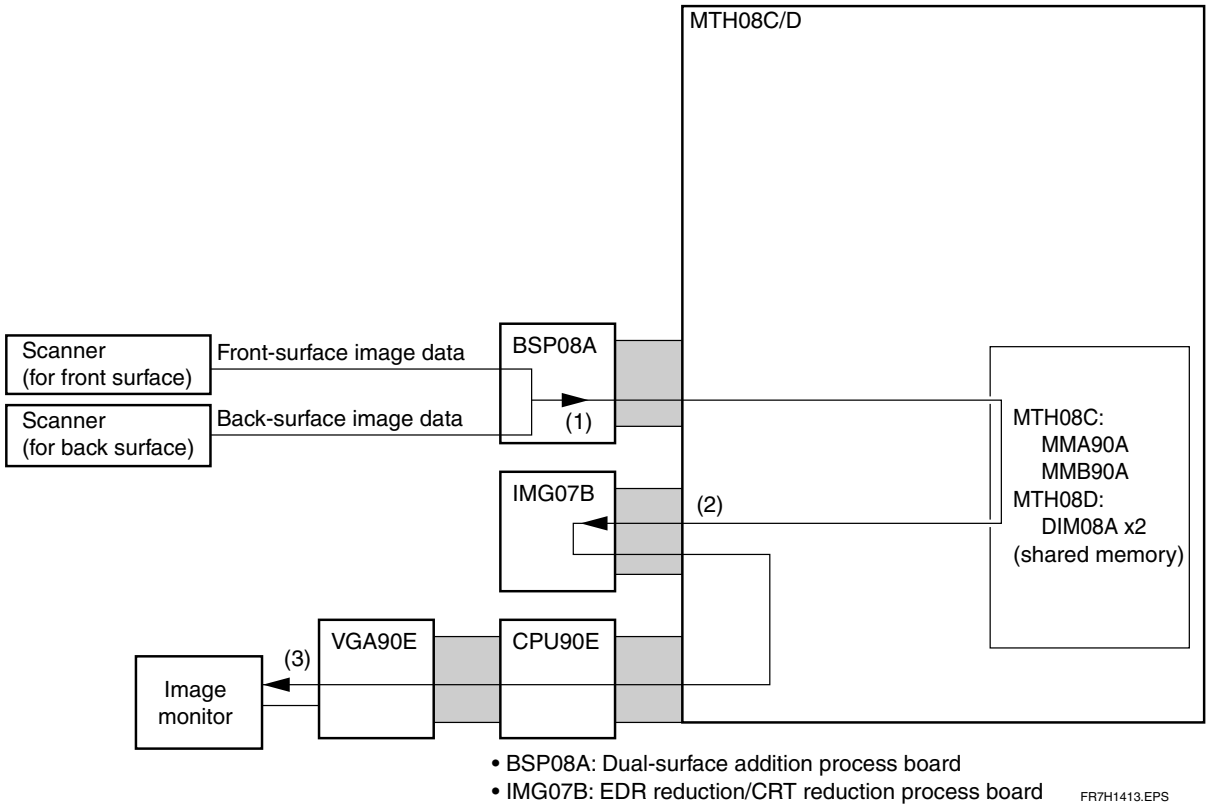
(3) The image data in the shared memory is saved onto the hard disk drive.

(4) The image data on the hard disk drive is delivered to the HCP08A board, subjected to image data compression and written into the shared memory.

(5) The image data in the shared memory is saved onto the hard disk drive.

(6) The image data on the hard disk drive is delivered to the CPU90F/LAN90B board and subjected to network processing. The processed image data is then output to the network.

■ For data display on the image monitor

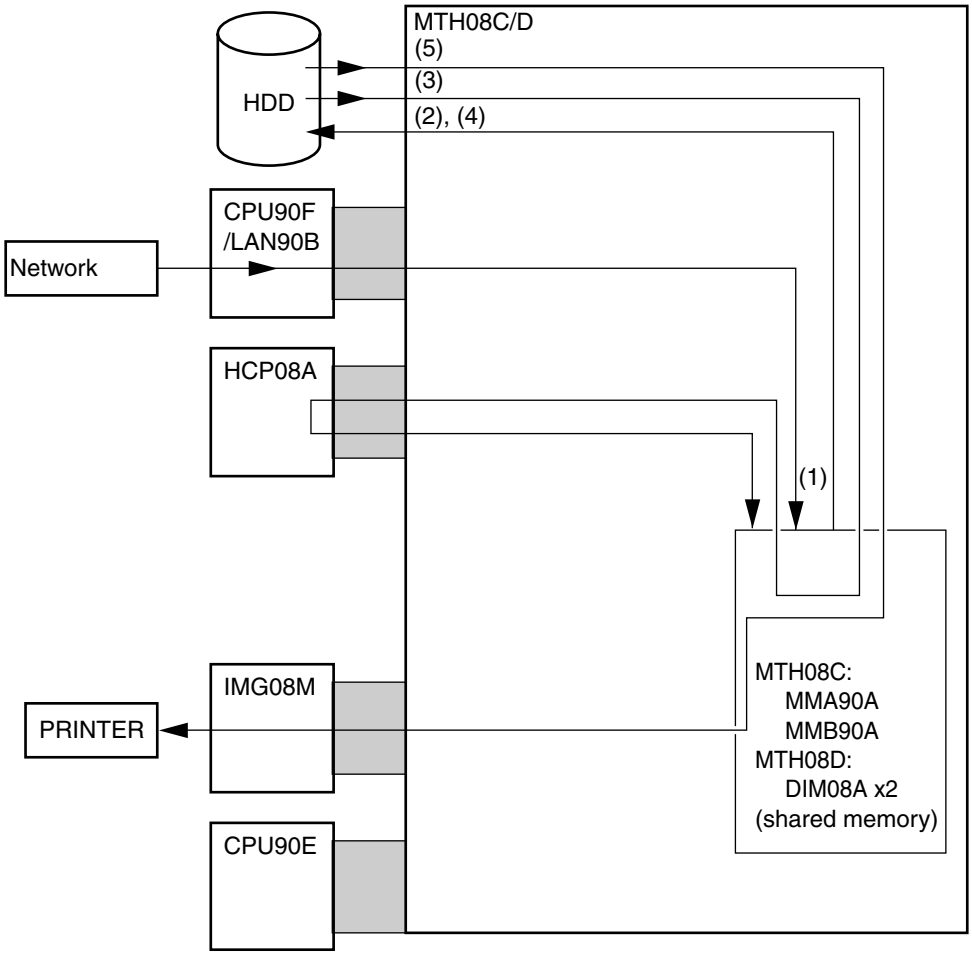


(1) The BSP08A board receives front- and back-surface image data from the scanner unit and adds them up.

(2) The image data derived from addition is subjected to EDR reduction and CRT image reduction processes on the IMG07B board.

(3) The image monitor displays the image data via the CPU90E and VGA90E boards.

■ For re-output from a networked system



- CPU90F/LAN90B : Ethernet board, 100Base-TX intelligent LAN board
- HCP08A : Compression/decompression process board
- IMG08M : LP interface board
- IMG07B : EDR reduction/CRT reduction process board

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(1) The image data transmitted through the network is written into the shared memory via the CPU90F/LAN90B board.

(2) The image data in the shared memory is saved onto the hard disk drive.

(3) The image data on the hard disk drive is delivered to the HCP08A board, subjected to image data compression and written into the shared memory.

(4) The image data in the shared memory is saved onto the hard disk drive.

(5) The image data on the hard disk drive is printed onto the printer via the IMG08M boards.

2.4 Startup Control Descriptions

■ Startup

(1) Upon power ON, the hard disk drive loads the program.

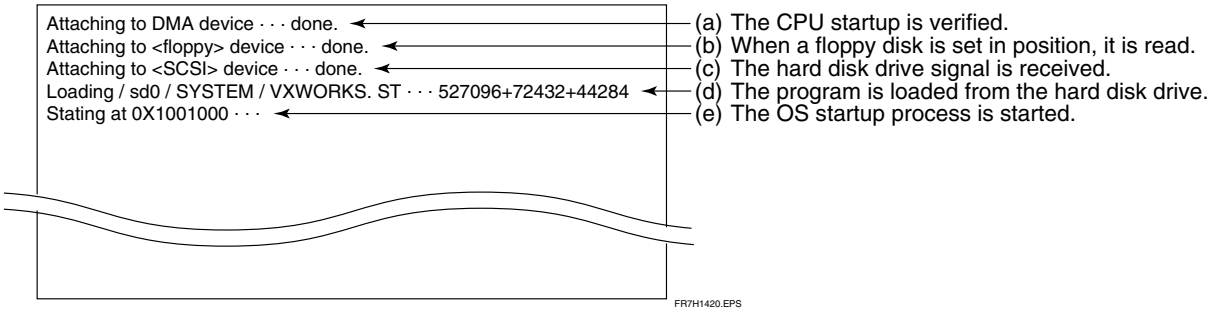
(2) The CPU90E board runs diagnostic checks on all the PC boards.

(3) The individual steps are initialized and subjected to self-diagnostic checkout

■ Description of Screens

This section explains how the contents of the display screen change between power ON and initialization.

❍ CPU communication screen


Attaching to DMA device · · · done.
Attaching to <floppy> device · · · done.
Attaching to <SCSI> device · · · done.
Loading / sd0 / SYSTEM / VXWORKS. ST · · · 527096+72432+44284
Stating at 0X1001000 · · ·
(a) The CPU startup is verified.
(b) When a floppy disk is set in position, it is read.
(c) The hard disk drive signal is received.
(d) The program is loaded from the hard disk drive.
(e) The OS startup process is started.
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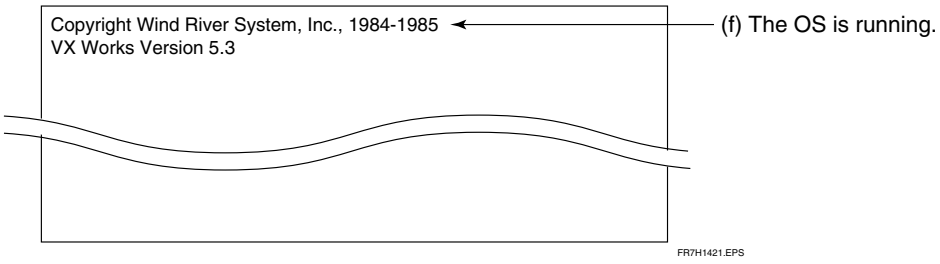
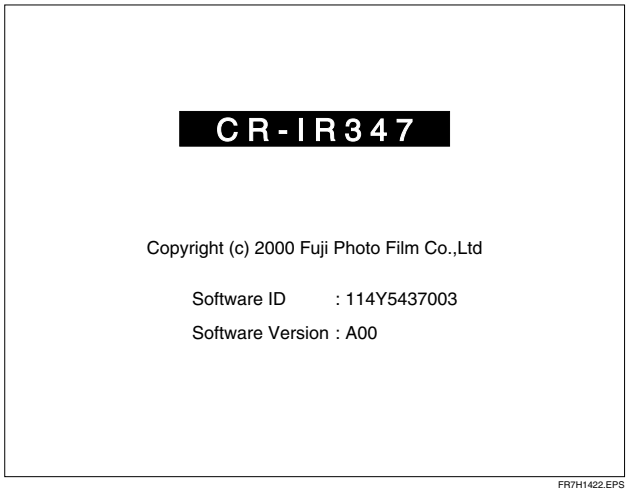
❍ OS startup screen



❍ Software version display screen



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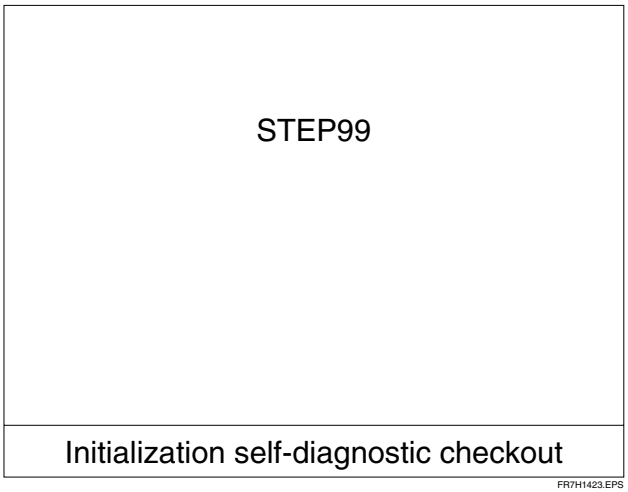
When this screen appears, click on the upper left and upper right corners of the screen, and the M-Utility starts.

❍ Initialization screen



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Processing of each step is as follows.

- Step 99: Panel control (PNL)
- Step 95: Log information control (JNL)
- Step 90: Conveyance control (IPH)
- Step 80: Read control (IMG)
- Step 70: DMS FINP output control (FOT)
- Step 65: ID information input control (IIF)
- Step 60: CSL control (CSL)
- Step 55: Image distribution control (DST)
- Step 40: LP output control (LIF)
- Step 35: DMS E-IF control (DIF)
- Step 30: DMS FINP input control (FIN)
- Step 15: Base on DICOM output control (DOT)
- Step 5: Image management system control (IMM)

3. Electrical

3.1 Power supply unit (JPS-6)

The power supply unit (JPS-6) supplies +5 VDC, +12 VDC, +15 VDC, and +24 VDC to various PC boards.

Further, this unit incorporates the inverter power supply circuit for fluorescent lamp illumination control to illuminate the erasure lamps.

Upon overvoltage/overcurrent detection, the output from this unit is shut off. Manual recovery is to be achieved by turning the circuit breaker OFF and then back ON.

■ Power Supply Unit (JPS-6) Output Details

Output terminal	Output voltage	Voltage accuracy	Voltage regulation range	Output current			Output destination board
				Minimum value	Steady-state value	Maximum value	
CN4	+5Vp	±5%	Fixed	0.1A	0.1A	0.1A	LED08A
TB2	+5V	±5%	±10%	2.0A	37A	37A	MTH08C/D
DCOUT1	+12V	±5%	±10%	1.0A	9.5A	9.5A	MTH08C/D
DCOUT2	+5V	±5%	Fixed	0.5A	3.0A	3.0A	SNS08C
DCOUT3	+15V	±5%	±10%	0A	0.6A	2.4A	DRV08A
	+24V	±5%	±10%	0.52A	1.46A	1.63A	
	+24V	±5%	±10%	0A	1.46A	1.63A	
	+24V	±5%	±10%	0A	1.46A	1.63A	
	+24V	±5%	±10%	0A	1.46A	1.63A	
DCOUT4	+24V	±5%	Fixed	0A	8.0A	12A	TSW1
DCOUT5	+24V	±5%	±10%	0A	0.26A	0.26A	TSW2 FAN
DCOUT6	+5V	±5%	±10%	1.0A	3.2A	3.2A	SCN08D
	+24V	±5%	±10%	0A	0.3A	0.6A	
	+15Va	±5%	±10%	0.1A	3.0A	3.0A	
	-15Va	±5%	±10%	0.1A	1.9A	3.0A	
DCOUT7	+5Vs	±5%	Fixed	0A	0.1A	0.1A	FFM
	+15V	±5%	±10%	0A	0.4A	2.0A	
DCOUT8	+15Vh	±5%	±10%	0A	1.5A	2.2A	PHV08D

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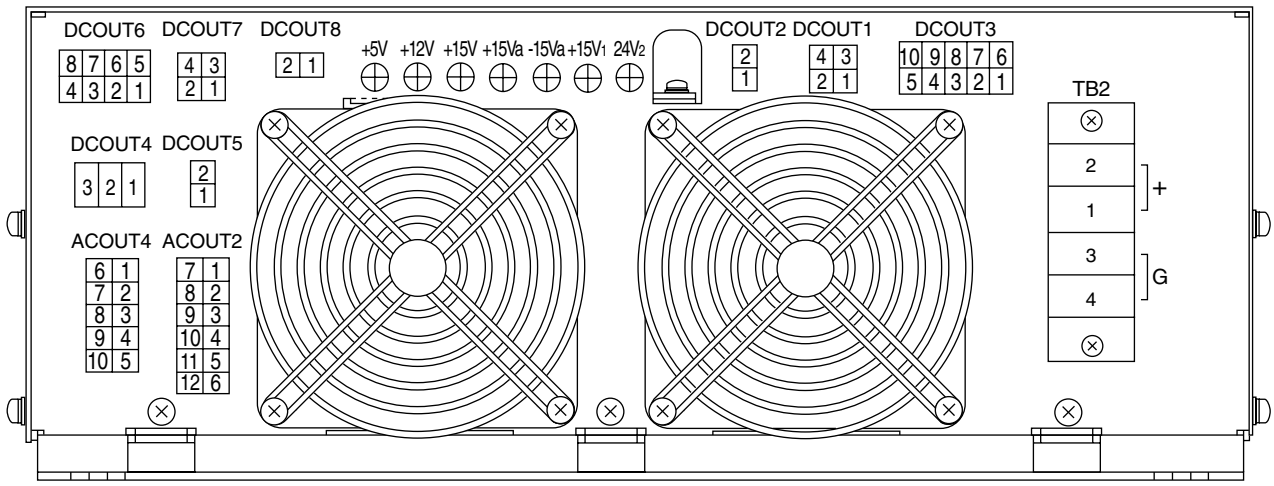
■ Power Supply Unit (JPS-6) Right-Hand Side View



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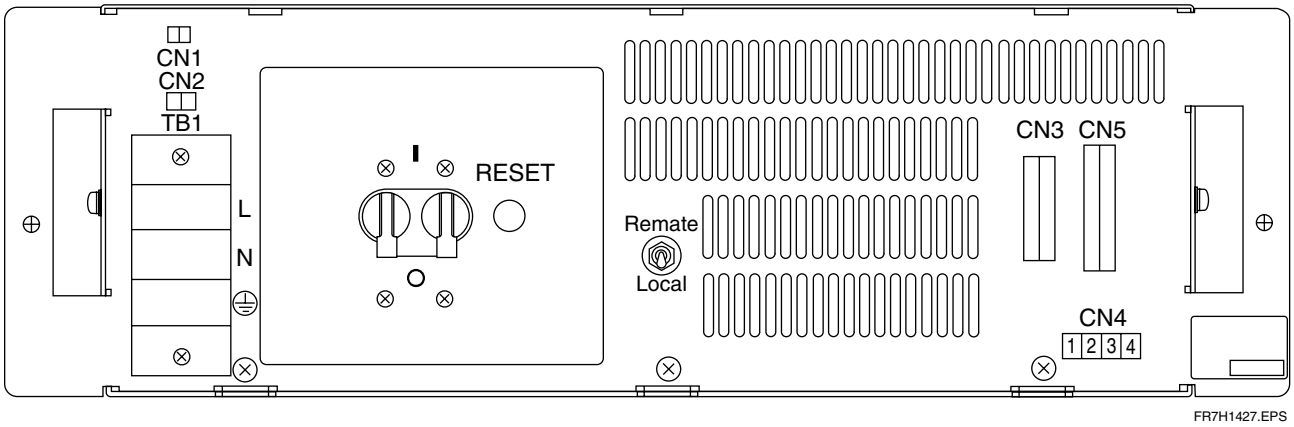
■ Power Supply Unit (JPS-6) Left-Hand Side View



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3.2 Erasure Unit

● Idle illumination control

To obtain a light intensity required for IP erasure, a predetermined temperature is maintained within the erasure unit by exercising lamp (LAMP1-LAMP5) illumination and FANM1 operation control after power ON.

● IP erasure control

To achieve IP image erasure, the erasure unit passage time is controlled in accordance with the processed IP dose.

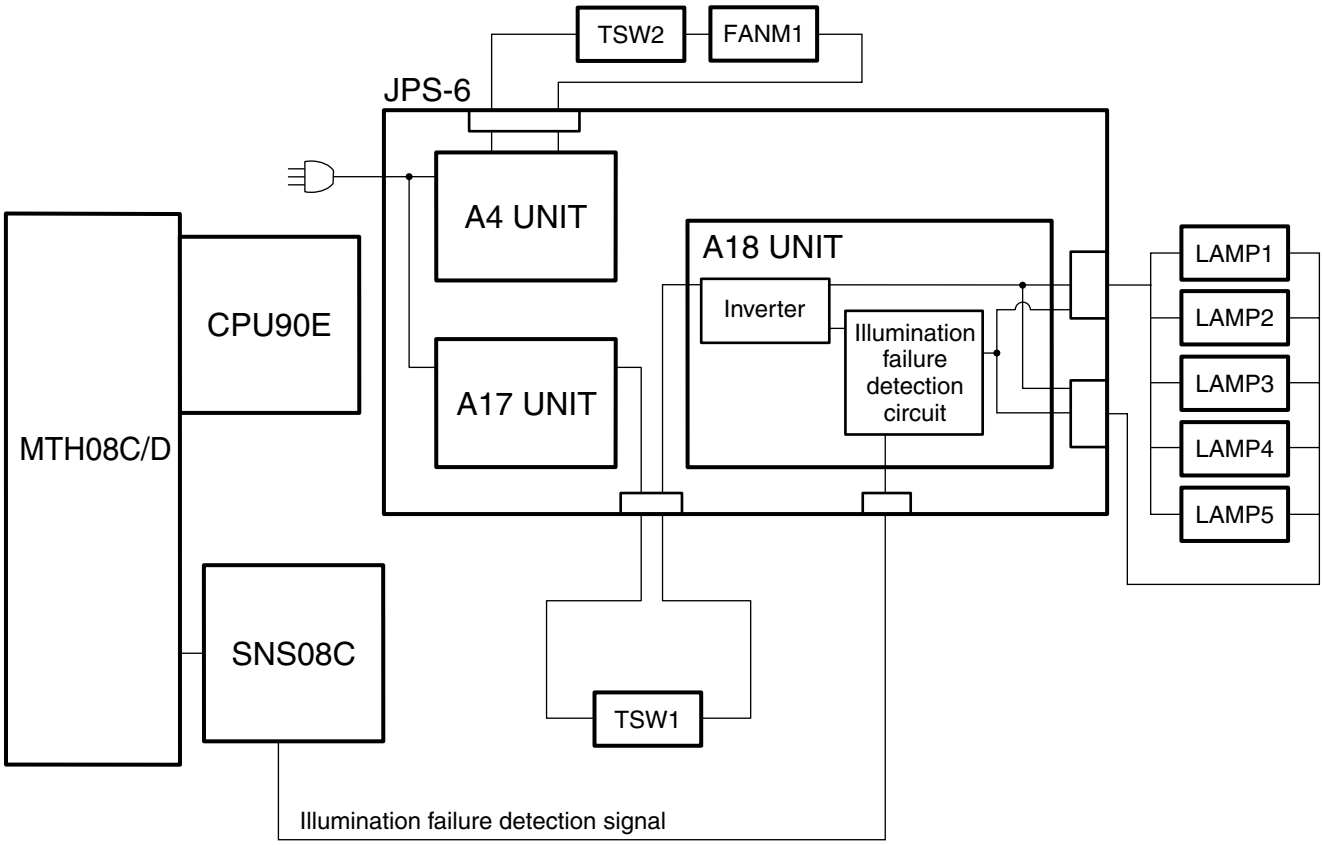
● Fan control

Fan control is exercised in such a manner as to operate the FANM1 when the temperature within the erasure unit is high.

● Temperature control

- The temperature thermistor (TSW2) detects the heat generated by the lamps (LAMP1-LAMP5) to provide control over FANM1 operation and lamp illumination.
- While no IP is being processed, control is exercised to automatically illuminate the lamps for temperature control purposes.
- The lamps are always turned ON for preheating purposes before they are illuminated for IP image erasure.

■ Components



FANM1 : Erasure cooling fan
TSW2 : Erasure thermostatic switch (temperature control switch)
TSW1 : Erasure thermostatic switch (thermal switch)

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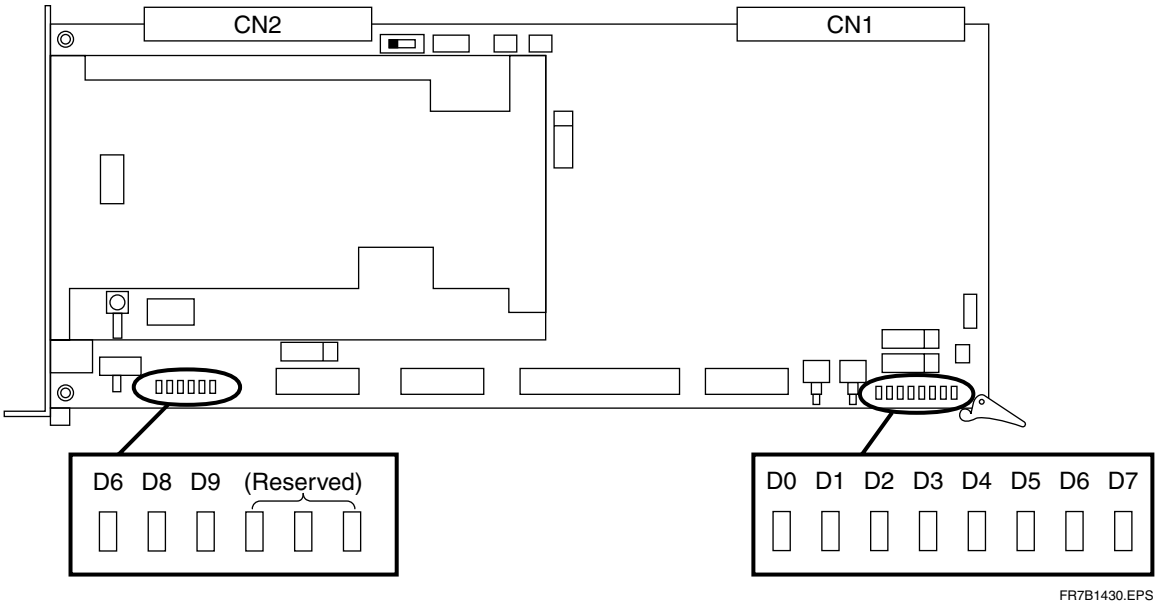
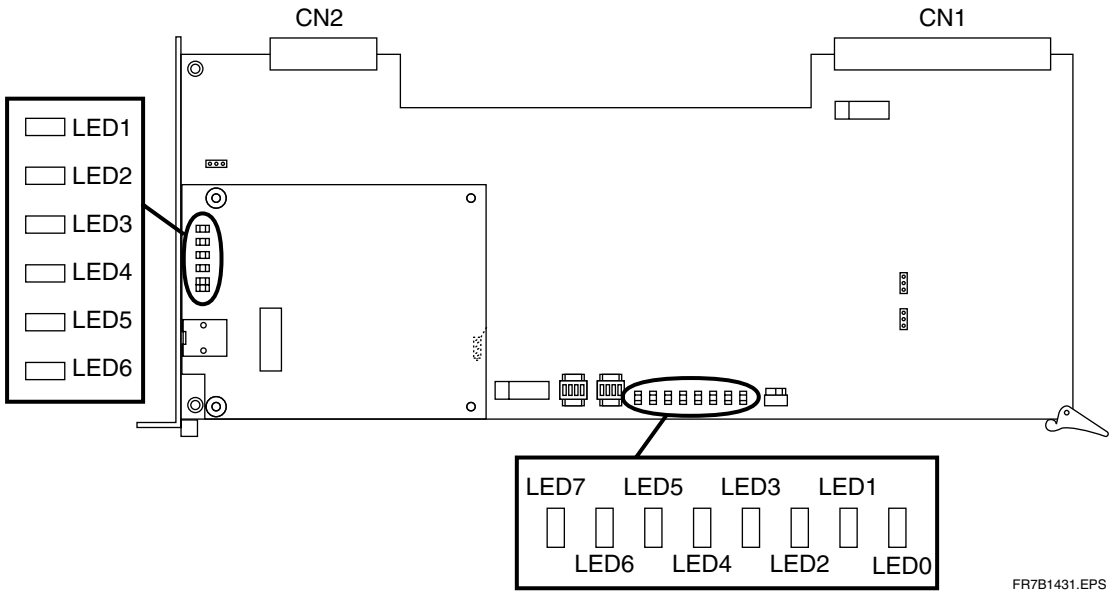
3.3 Information on Board LEDs

■ CPU90E Board (CPU Board)



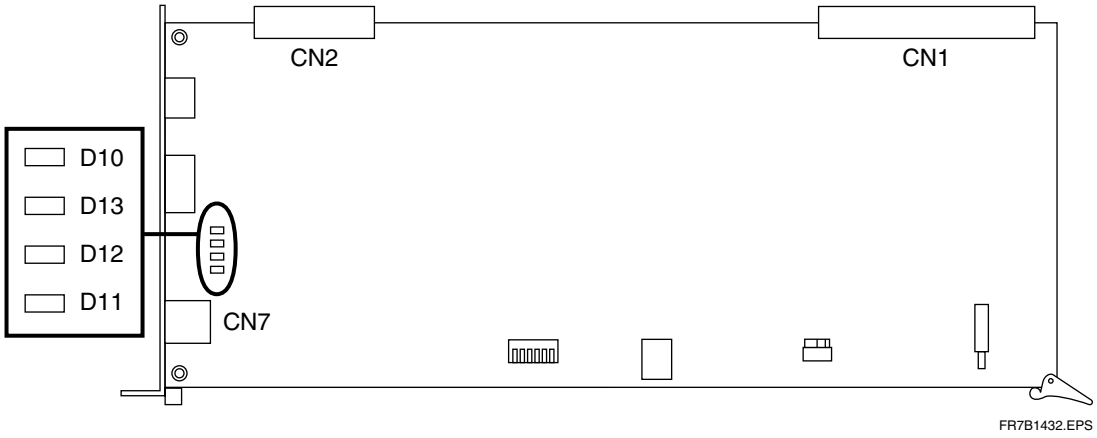
- When network data is transmitted : LED D6 glows.
- When network data is received : LED D8 glows.
- When a collision is detected : LED D9 glows.
- During system initialization : LED D0 glows.
- During OS kernel initialization : LEDs D0 and D1 glow.
- During system clock initialization : LED D2 glows.
- During monitor initialization : LEDs D0 and D2 glow.
- During system task initialization : LEDs D1 and D2 glow.
- During boot ROM task initialization : LEDs D0, D1, and D2 glow.
- During DMA initialization : LED D3 glows.
- During boot device (SCSI/FD) initialization : LEDs D0 and D3 glow.
- During a system code read : LEDs D1 and D3 glow.
- Upon system code startup : LEDs D0, D1, and D3 glow.
- During an idle state : LEDs D0 to D7 sequentially come on.
- When an error occurs : LEDs D0 to D7 simultaneously blink.

■ CPU90F Board (Network Interface Board)



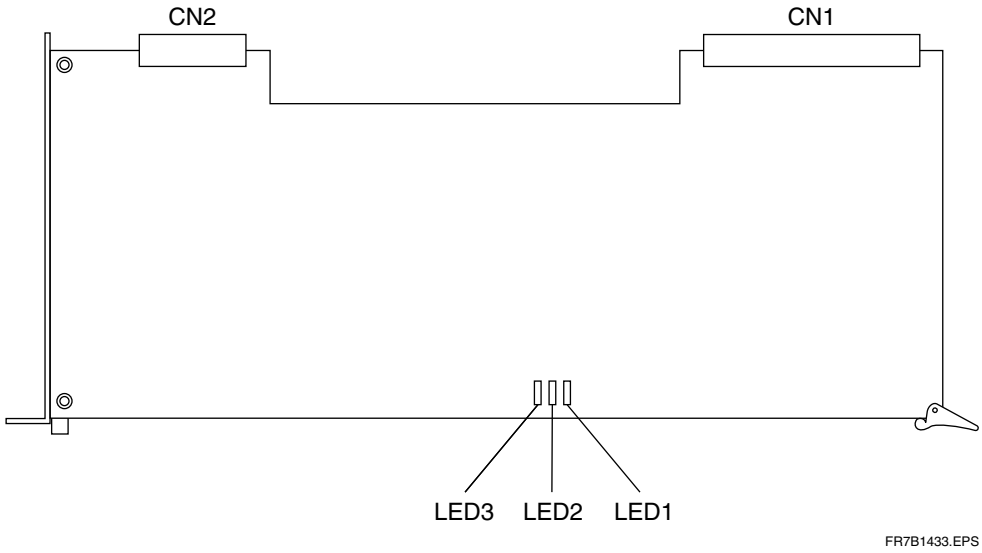
- When network data is transmitted : LED1 glows.
- When network data is received : LED2 glows.

■ LAN90B Board (Network Interface Board)



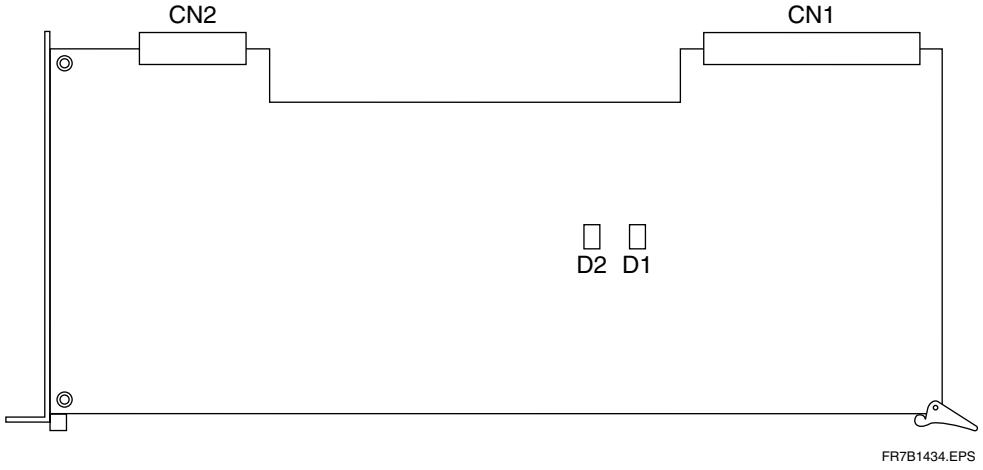
- When network data is transmitted : LED D13 glows.
- When network data is received : LED D12 glows.

■ HCP08A Board (Compression/Decompression Board)



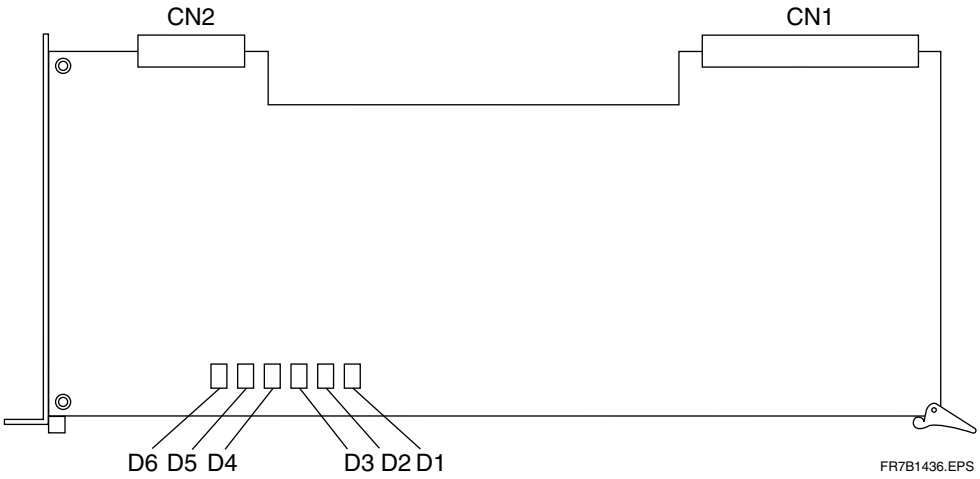
- During an idle state : LED1, LED2, and LED3 sequentially come on.
- When an error occurs : LED1, LED2, and LED3 simultaneously blink.

■ IMG07B Board (EDR Reduction/CRT Reduction Board)



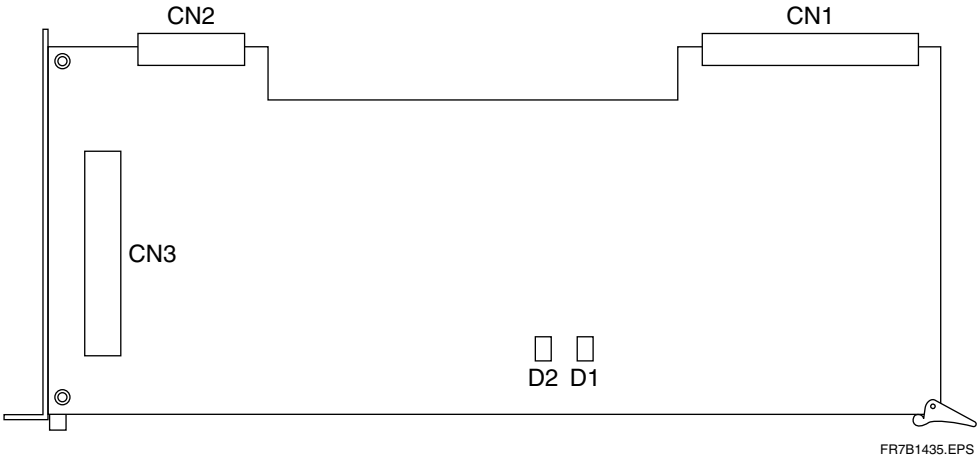
- During an idle state : LEDs D1 and D2 alternately come on.
- When an error occurs : LEDs D1 and D2 simultaneously blink.

■ BSP08A Board (EDR Reduction/CRT Reduction Board)



- During an idle state : D1, D2, and D3 sequentially come on.
  D4, D5, and D6 sequentially come on.
- When an error occurs : LEDs D1, D2, D3, D4, D5 and D6 simultaneously blink.

■ DMC08A Board (DMS Interface Board)



- During an idle state : LEDs D1 and D2 alternately come on.
- When an error occurs : LEDs D1 and D2 simultaneously blink.

■ SCN08D Board (Scanner System Board)

☞ “Machine Description” volume, “4.2 Scanner Operation Descriptions”, “■ Operation descriptions”, “● Functions of LEDs on SCN08D board”

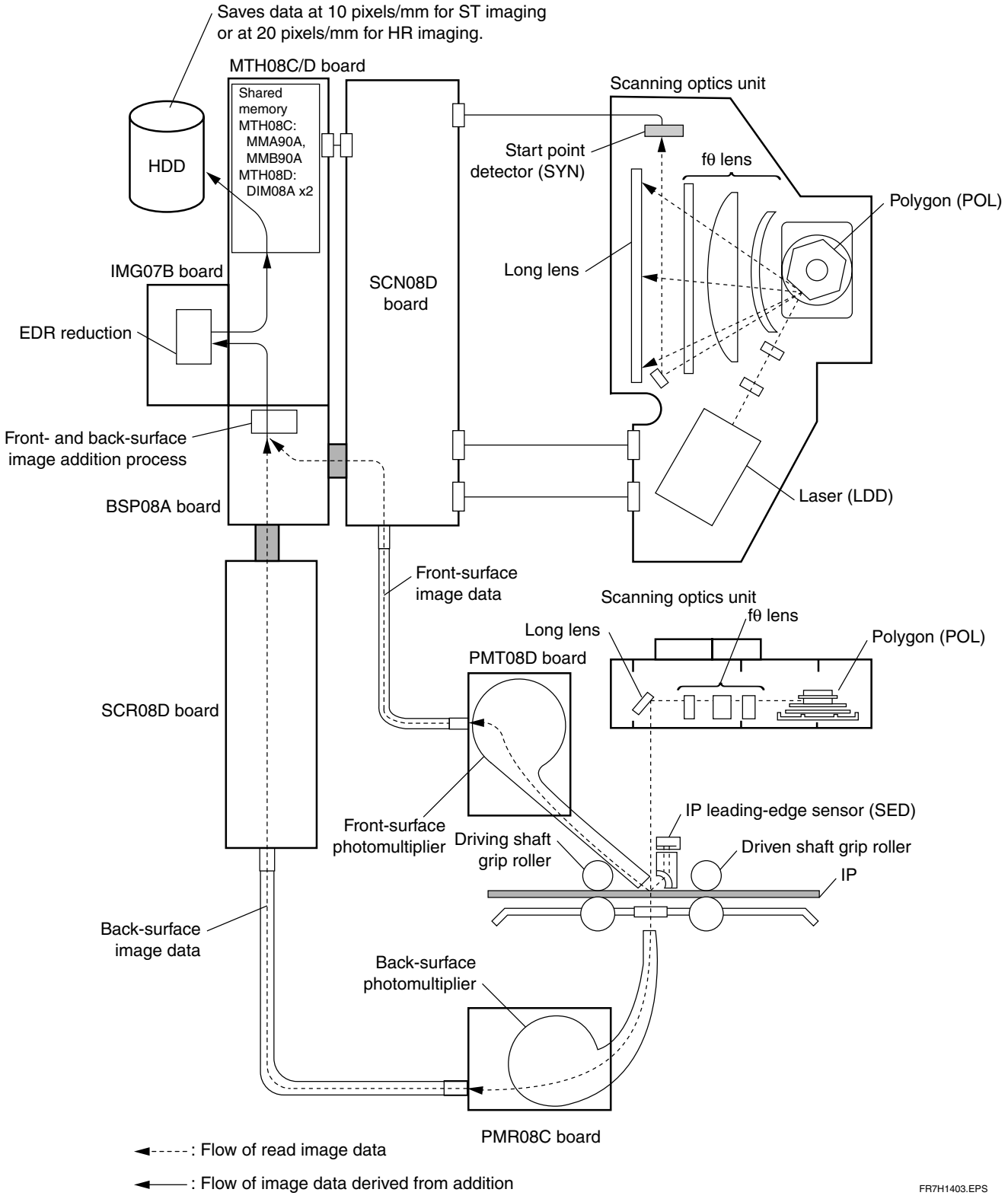
4. Scanner

CAUTIONS

- *When servicing a PC board, be sure to wear a wristband to ground your body. If you do not ground your body, the buildup of static electricity on your body may damage electronic components on the PC board.*
- *When handling the scanning optics unit, exercise care not to shock it.*
- *Do not put your fingers into the emission port in the bottom of the scanning optics unit.*

This section explains about the scanner mechanism and its control functions.

4.1 Scanner Components



4.2 Scanner Operation Descriptions

■ I/O units

● Scanning optics unit

This unit consists of the laser (LDD, 50 mW), polygon (POL), start point detector (SYN), and fθ lens.

● Subscanning unit

This unit consists of the diving shaft grip roller, driven-shaft grip roller, front-surface photomultiplier (PMT), back-surface photomultiplier (PMR), and leading-edge sensor (SED).

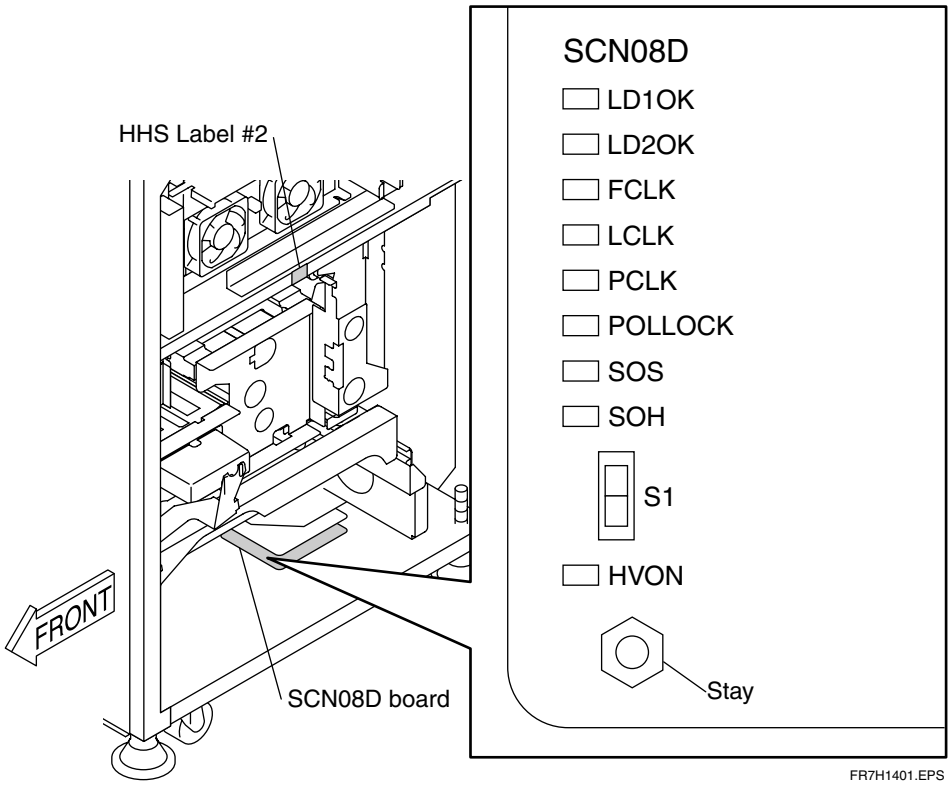
■ Operation descriptions

The SCN08D board controls the scanning optics unit and photomultipliers and communicates with the main CPU on the CPU90E board.

● Features

The LEDs on the SCN08D board indicate the control signal status of various I/Os.

● Functions of LEDs on SCN08D board



LED	Meaning	LED glowing/blinking	LED extinguished
LD1OK	OK signal from the laser (LDD) (laser power: 50% or higher).	GOOD	NG
LD2OK			
FLK, LCLK, PCLK	Reference signal issued by the SCN08D board.	–	–
POLLOCK	OK signal from the polygon (POL).	GOOD	NG
SOS	Detection signal from the start point detector (SYN).	Detected	Not detected
SOH	Detection signal from the leading edge sensor (SED).	Detected	Not detected
HV ON	High-voltage switch status signal. ON : The software switch and hardware switch (S1) are both ON. OFF : Either the software switch or the hardware switch (S1) is OFF.	ON	OFF

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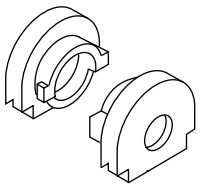
5. Mechanical

■ Common parts

● E-ringless housings

The employed housings can be secured to side plates without E-rings.



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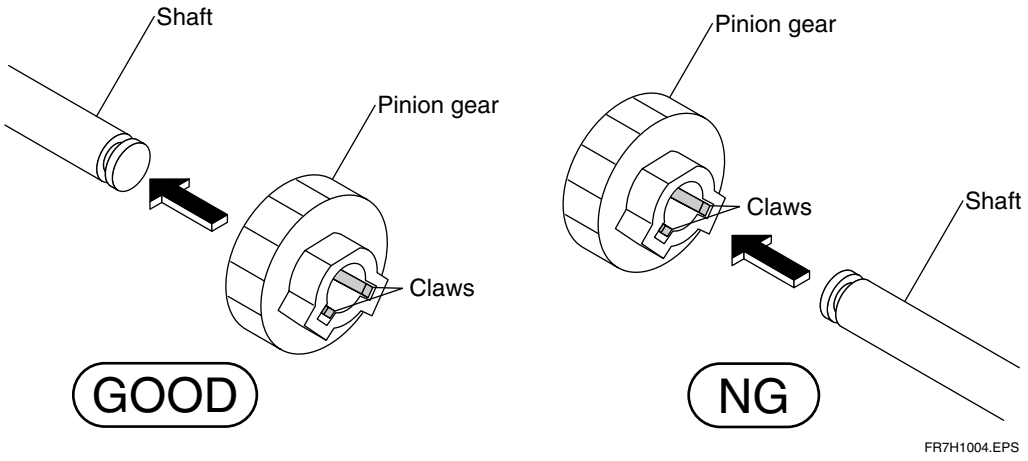
● Snap-fit pinion gears

The employed pinion gears can be installed and removed without using clamps or tools.

CAUTION

When installing a pinion gear over its shaft, ensure that it is properly oriented. If you install the pinion gear over the shaft while it is reversed, its claws may become damaged.



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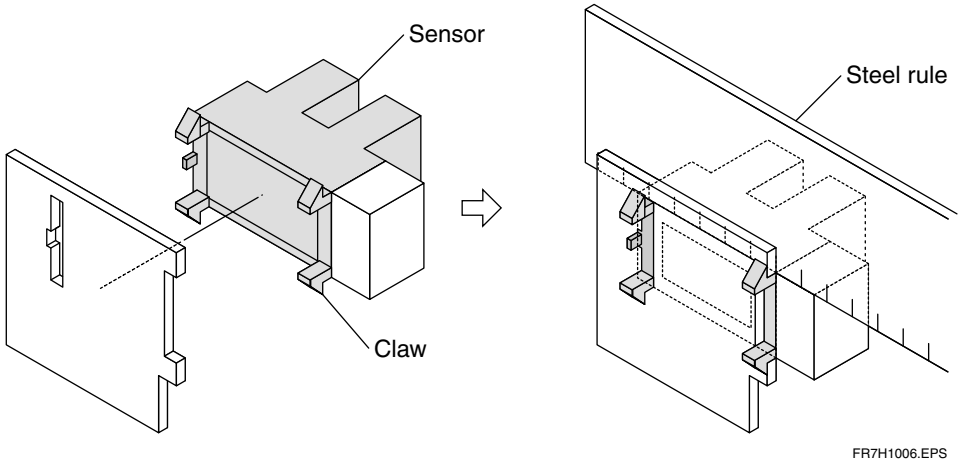
● Photosensors

In marked contrast to the previously used screw-on type, the currently employed photosensors are to be claw-locked (for displacement prevention).

CAUTION

When removing or installing a photosensor, use a steel rule or the like and exercise care not to damage the sensor claws.



5.1 Cassette Set Unit

This section describes the features of the cassette set unit.

■ Differences from the CR-IR342 (FCR5000R)

- The barcode reader (BCRK1) is added for double-sided HR-IP detection.
- The double-sided HR-IP is identified when the barcode label attached to a lateral surface of the dedicated double-sided HR-IP cassette is read.

■ Cassette set unit operations

- Opens the cassette when it is inserted into its position.
- Locks the inserted cassette with the hold pin to prevent it from being pulled out during IP conveyance.
- The barcode reader (BCRK1) reads the barcode (IP number) on a lateral surface of the inserted cassette. It concludes that the double-sided HR-IP is inserted when the barcode is successfully read. If the barcode is not successfully read, the barcode reader concludes that the single-sided ST-IP is inserted.
  - Barcode label not found : Single-sided ST-IP
  - Barcode label found : Double-sided HR-IP

5.2 IP removal unit

This section describes the features of the IP removal unit.

■ Differences from the CR-IR342 (FCR5000R)

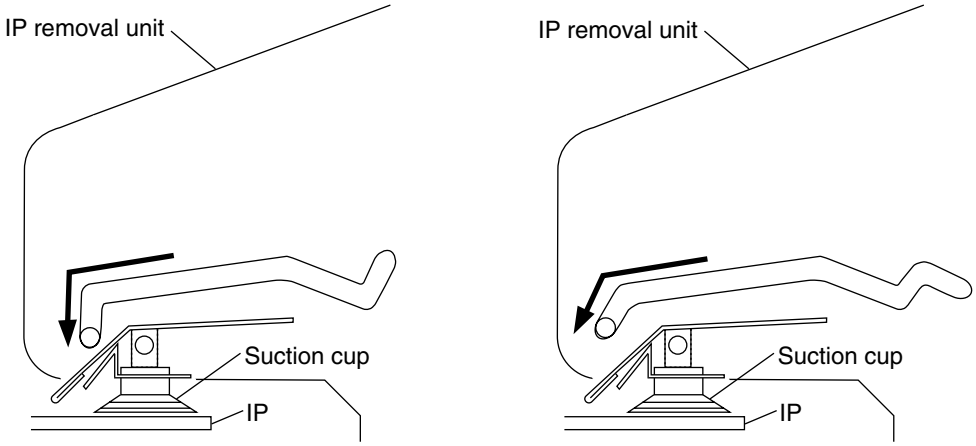
- The IP removal arm traveling course is changed.

  CR-IR347 (model described in this document):

  The IP removal arm (suction cup assembly) descends vertically toward the IP.

  CR-IR342 (FCR5000R):

  The IP removal arm (suction cup assembly) descends obliquely toward the IP.



CR-IR347 CR-IR342 FR7H1415.EPS

- To prevent the double-sided HR-IP surfaces from being scratched or soiled, a guide plate with a shock absorber is added to the areas with which the IP front surface comes into contact. Further, a shock absorber is attached to every guide plate that comes into contact with the IP back surface.
- The newly employed suction cup assembly has increased durability and needs no periodic replacement.

■ IP removal unit basic operations

The IP removal unit mainly performs the following operations:

- Operates the suction cup assembly to vacuum-retain the IP in the cassette and transfer it to the feed roller (IP feed operation).
- Determines whether the IP is of an inch type or metric type.
- Transports the IP to the erasure conveyor.
- Operates the suction cup assembly to vacuum-retain the IP transported from the erasure conveyor and insert it into the cassette (IP load operation).

■ Suction cup HP

The actuator mounted on the IP removal arm opens/closes the suction cup HP sensor (SL1). The suction cup HP is reached when the sensor is closed.

■ IP feed operation

● IP feed suction

The suction cup driving motor (ML1) rotates to move the suction arm (suction cup assembly) in the HP toward the cassette cover. The moment the suction cup assembly reaches the IP suction position, the IP suction pump (PL1) operates to retain the IP by means of a vacuum.

If the suction sensor (SL5) does not close within a period of 1 second after IP suction pump (PL1) operation, an IP suction failure results.

● IP feed suction leak

After the vacuum-retained IP is transferred to the feed roller, the IP suction leak valve (SVL1) operates to separate the IP from the suction cup assembly.

When the leading edge of the transferred IP closes the cassette opening IP sensor (SL2), the IP feed operation is normal.

■ IP load operation

● IP load suction

The IP removal arm (suction cup assembly) moves from the suction cup HP to the IP standby position and then stands by. When the IP is conveyed to the cassette, the IP suction pump (PL1) operates to vacuum-retain the IP trailing edge.

● IP load suction leak

The IP removal arm (suction cup assembly) moves toward the cassette cover while the IP is retained by means of a vacuum. The IP suction leak valve (SVL1) then operates to separate the IP from the suction cup assembly.

5.3 Erasure Conveyor

This section describes the features of the erasure conveyor.

■ Differences from the CR-IR342 (FCR5000R)

- The single-surface cleaning roller assembly is superseded by the dual-surface cleaning type (having two brush rollers).
- A static eliminator brush is added to prevent dust buildup on the IP surfaces.
- Shock absorbers are attached to the guide and reflection plates to prevent the double-sided IP surfaces from being scratched.

■ IP feed conveyance (IP size detection)

While the IP is transported from the IP removal unit to the side-positioning conveyor, the before-BCR IP sensor (SM1) measures the IP length (by measuring the time required for the IP to pass through the SM1) to determine the IP size.

■ IP load conveyance (image erasure)

While the IP is being transported by driving the IP transport motor (MM1) after completion of an image read process, the erasure lamps emit fluorescent light to erase image data from the IP.

5.4 Side-Positioning Conveyor

This section describes the features of the side-positioning conveyor.

■ Differences from the CR-IR342 (FCR5000R)

- To prevent the double-sided HR-IP surfaces from being scratched or soiled, a guide plate with a shock absorber is added to the areas with which the IP front surface comes into contact. Further, a shock absorber is attached to every guide plate that comes into contact with the IP back surface.
- A static eliminator brush is added to prevent dust buildup on the IP surfaces.
- A cleaning guide mechanism designed only for the double-sided HR-IP is added to remove dust.

■ Barcode reader (BCRN1) reading operation

The barcode reader (BCRN1) reads the barcode label attached to the single-sided ST-IP to determine the IP number.

■ Side-positioning conveyor operations

● Cleaning guide operation

During an IP travel from the erasure conveyor to the side-positioning conveyor, the cleaning guide driving motor (MN4) operates to press the cleaning guide against the double-sided HR-IP only. The cleaning guide removes dust from the IP prior to IP reading.

● IP top stopper operation

After the IP is cleaned by the cleaning guide, the side-positioning sensor status (open or closed) is detected.

When the sensor is open, the side-positioning motor (MN1) operates to raise the IP top stopper. When the sensor is closed, the IP is at the IP top stopper position. In this instance, the IP transport motor (MN3) operates to transport the IP backward, and then the side-positioning motor (MN1) operates to raise the IP top stopper.

● Grip roller release

When the leading edge of the transported IP closes the side-positioning IP sensor (SN3), the grip release motor (MN2) operates to release the grip roller grip. When the grip is released, the conveyance force brings the IP into contact with the IP top stopper.

Note that the above grip release motor (MN2) operation places the side guide in the IP reference position (3 mm from the side plate).

● Side-positioning

The IP brought into contact with the IP top stopper is subjected to side-positioning.

When the side-positioning motor (MN1) operates, the side-positioning mechanism claw assembly presses the IP against the reference surface (side guide). The distance the side-positioning motor (MN1) moves varies with the IP size.

For increased side-positioning accuracy, the side-positioning operation is performed two times.

To prevent the IP from being fogged, the side-positioning IP sensor (SN3) light emitter is extinguished during the side-positioning sequence.

5.5 Subscanning Unit

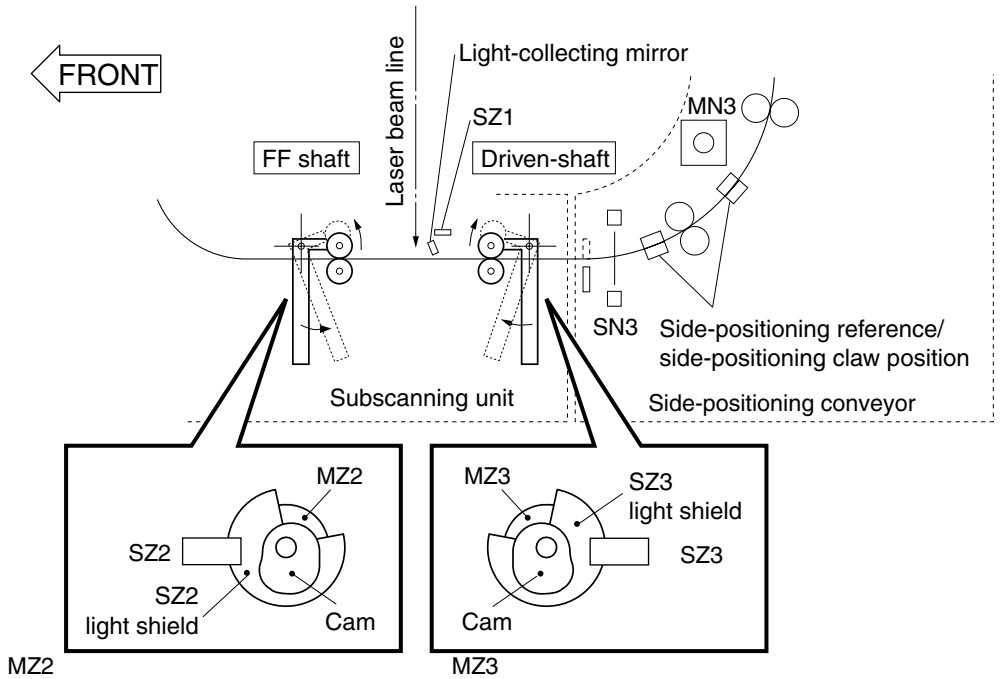
This section describes the features of the subscanning unit.

■ Differences from the CR-IR342 (FCR5000R)

- The light-collecting guide assembly for the back surface is added.
- The reflection-type IP leading-edge sensor (SZ1) is employed instead of a transmission type. Its light receptor is built in the light-collecting mirror. Since the employed sensor is of a reflection type, it opens when the IP is not present and closes when the IP is present.
- The central portion of the center guide plate is made of glass (glass guide) to collect laser light from the IP back surface.
- To prevent the double-sided HR-IP surfaces from being scratched or soiled, a guide plate with a shock absorber is added to the areas with which the IP front surface comes into contact. Further, a shock absorber is attached to every guide plate that comes into contact with the IP back surface.

■ Driving-shaft roller grip/driven-shaft roller grip

The driving-shaft and driven-shaft rollers are gripped by their respective motors. Their respective grip motors (MZ2 and MZ3) are slowly driven to avoid IP irregularities.



■ Read conveyance

● Preparations for reading (driven-shaft grip)

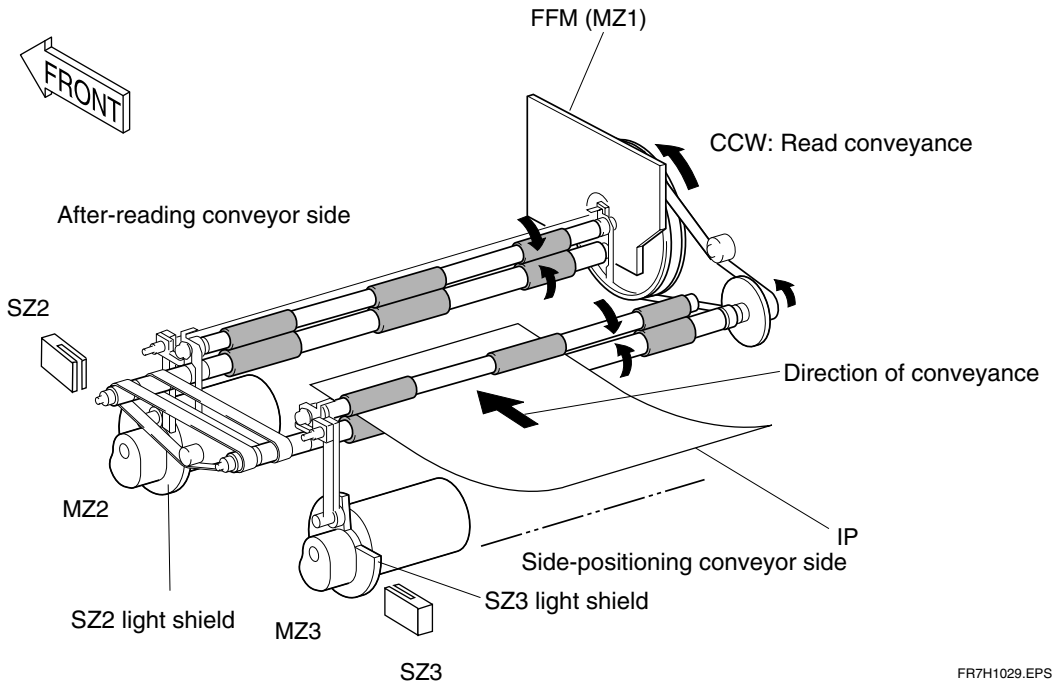
After the IP is subjected to side-positioning, the IP transport motor (MN3) operates to transport the IP to the driven-shaft roller. The driven-shaft grip motor (MZ3) then operates to grip the driven-shaft roller.

When the driven-shaft roller is gripped, the side-positioning conveyor grip is released.

● Read conveyance (driving-shaft grip)

The subscanning motor (FFM/MZ1) operates to transport the IP from the driven-shaft roller position to the IP leading-edge sensor (SZ1) position.

When the IP leading-edge sensor (SZ1) closes, the IP reading sequence starts. While the IP is being read, the driving-shaft grip motor (MZ2) causes the driving-shaft roller to grip the IP. When the driving-shaft roller grips the IP, the driven-shaft grip motor (MZ3) operates to release the driven-shaft roller grip.

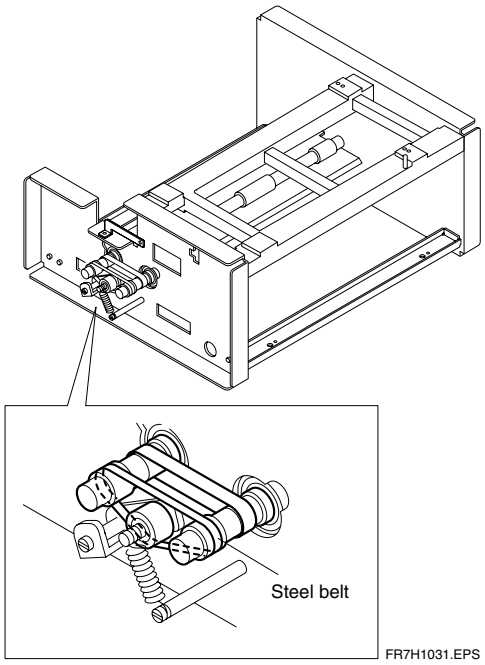


● Mirror ascent

When the IP reading sequence ends, the driven-shaft roller and side-positioning conveyor grip roller grip the IP. At the same time, the mirror driving motor (MN4) raises the light-collecting mirror assembly to provide an IP path for IP load conveyance.

■ Motive force transmission (from driving shaft to driven shaft)

The driving shaft receives a driving force from the MZ1 (FFM) and transmits it to the driven shaft via the steel belt (stainless steel belt). The use of the steel belt not only prevents the belt from being badly stretched but also accurately transmits the reading speed provided by the MZ1 (FFM).



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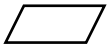
8. Mechanical Control Flowcharts

8.1 Viewing the Control Flowcharts

This section shows how to read the control flowcharts.

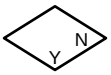
: Start of sequence



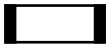
: User operation

: Normal processing

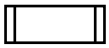
: Normal processing, timer start (start point for detecting timeout)



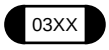
: Decision block



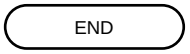
: Main routine



: Subroutine name



: Occurrence of error



: End of sequence

PK11 : Control parameter for pulse motor
- Number (serial number)
- Unit number (K through N)

TK11 : Timer value or timeout value
- Number (serial number)
- Unit number (K through N, Z)

NK11 : Retry value
- Number (serial number)
- Unit number (K, L, N)

(Software): Software stop.
The software constantly monitors the changes in the sensor status via a register. Upon receipt of a stop instruction, the software resets the pulse motor controller to invoke a stop. When compared to a hardware stop, a software stop occurs with a delay of about 30 to 50 msec.

(Hardware): Hardware stop.
The hardware on an PC board checks for sensor status changes. A hardware stop can be achieved immediately by sending a signal to a motor board.

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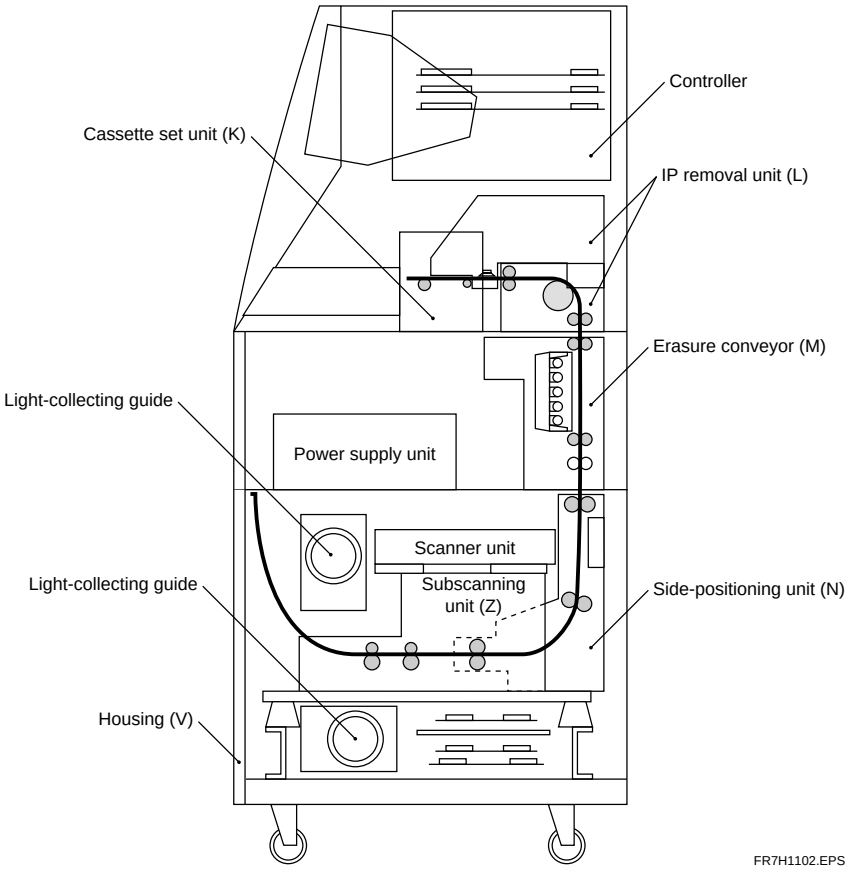
■ Unit arrangement



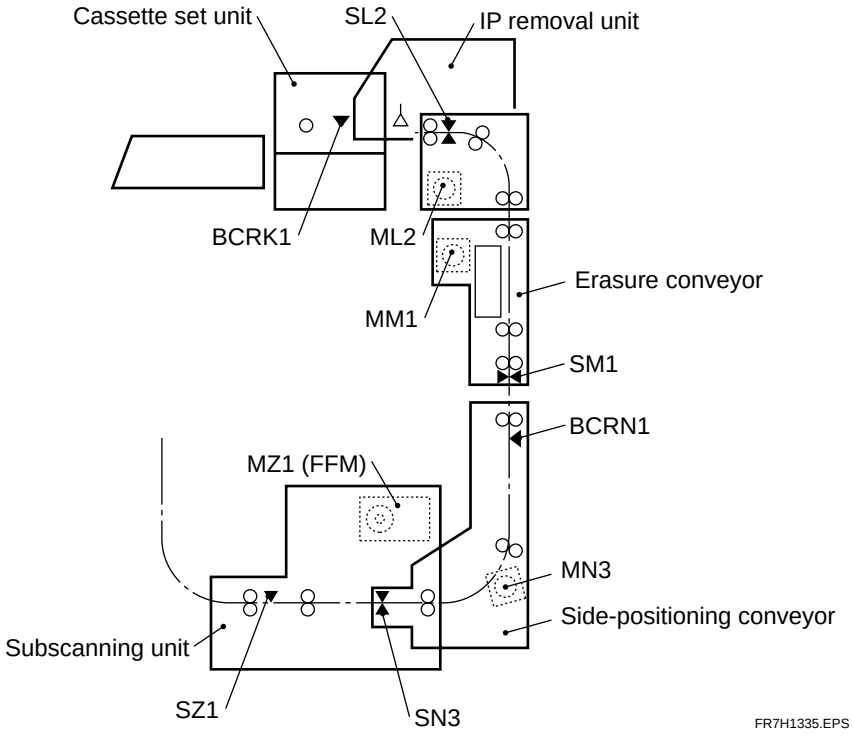
● Units related to mechanical control descriptions

K: Cassette set unit
L: IP removal unit
M: Erasure conveyor
N: Side-positioning conveyor
Z: Subscanning unit

● Units not covered by mechanical control descriptions

V: Housing
Controller
Power supply unit
Scanning optics unit

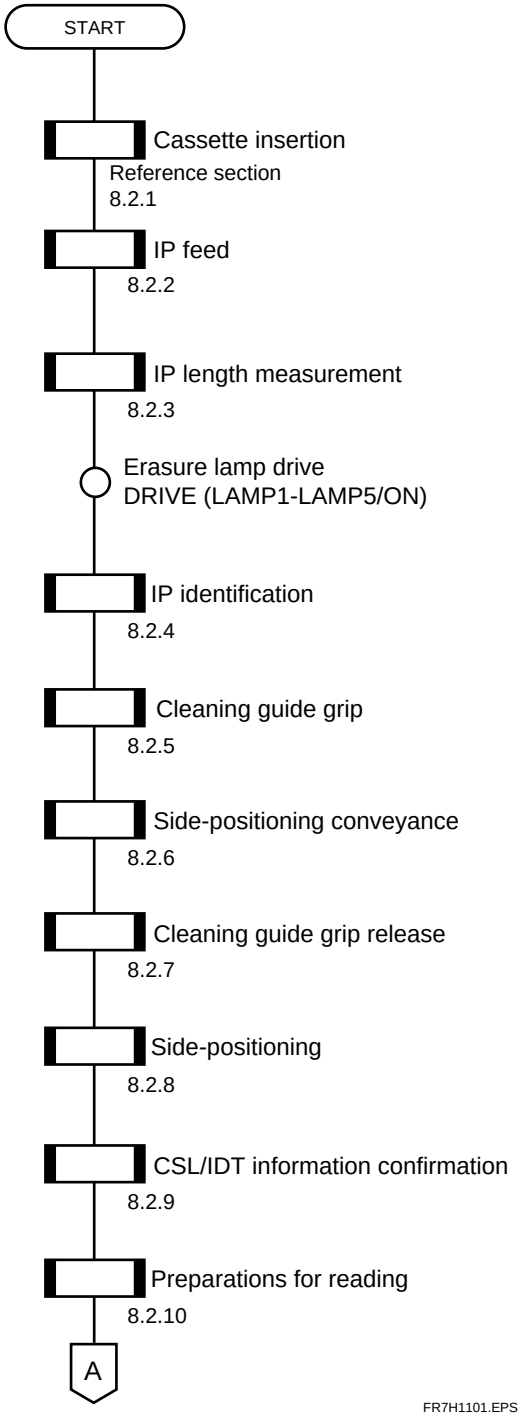
■ IP conveyance path

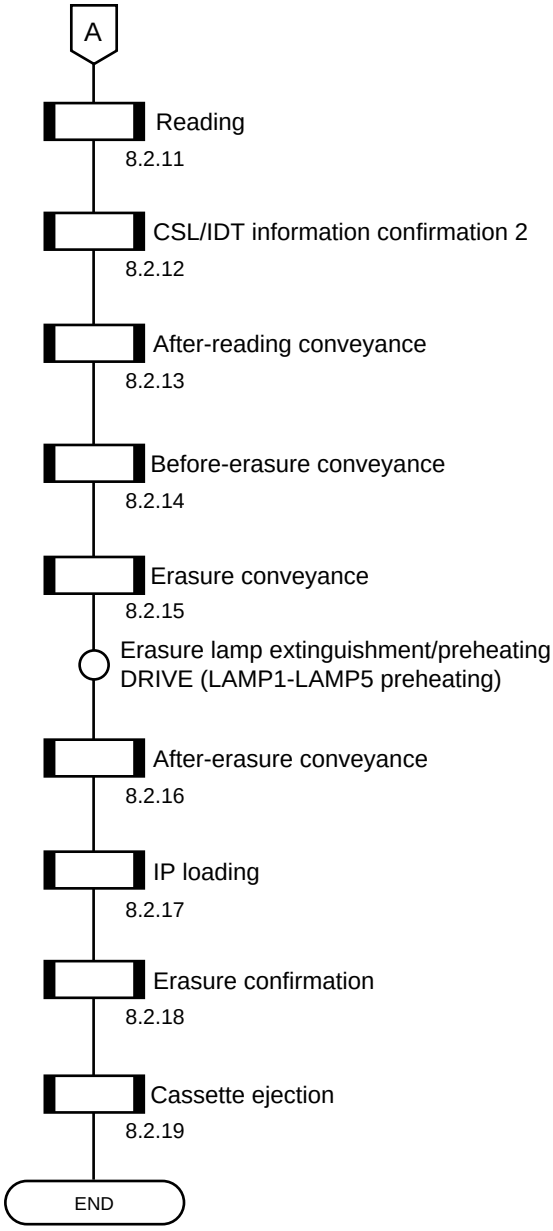


ML2: IP transport motor
MM1: IP transport motor
MN3: IP transport motor
MZ1: Subscanning motor
SL2: Cassette opening IP sensor
SM1: Before-BCR IP sensor
SN3: Side-positioning IP sensor
SZ1: IP leading-edge sensor
BCRK1: Barcode reader
BCRN1: Barcode reader

8.2 Normal Operation Flowcharts

<Figure 1 Overall flowchart>





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8.2.1 Cassette insertion

Sequence overview

The operations in this sequence are performed by the cassette set unit.

In the cassette insertion sequence, the operations are performed to detect a an inserted cassette, hold it, and check whether it is properly held.

<Figure 1 Cassette insertion flowchart>

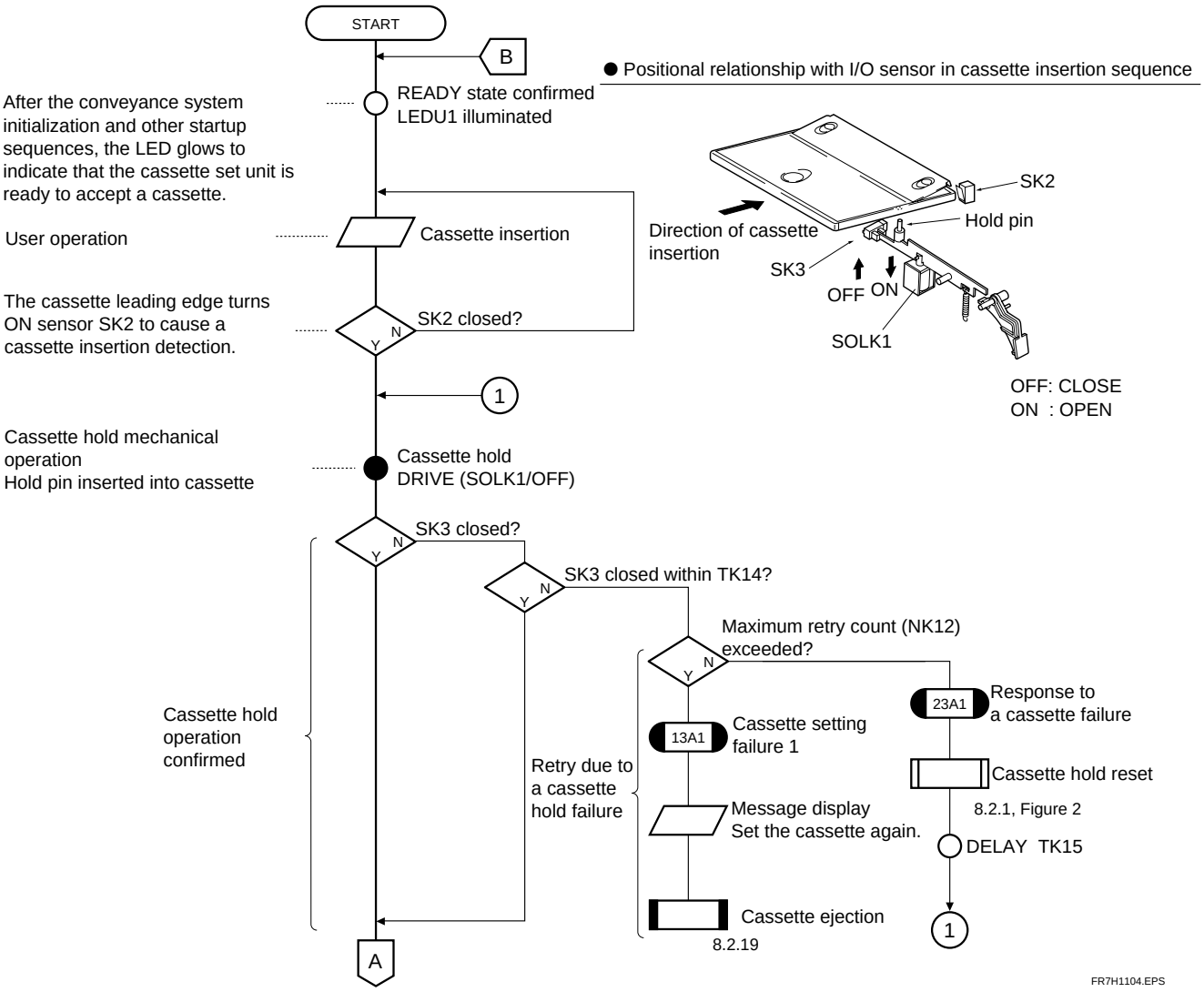
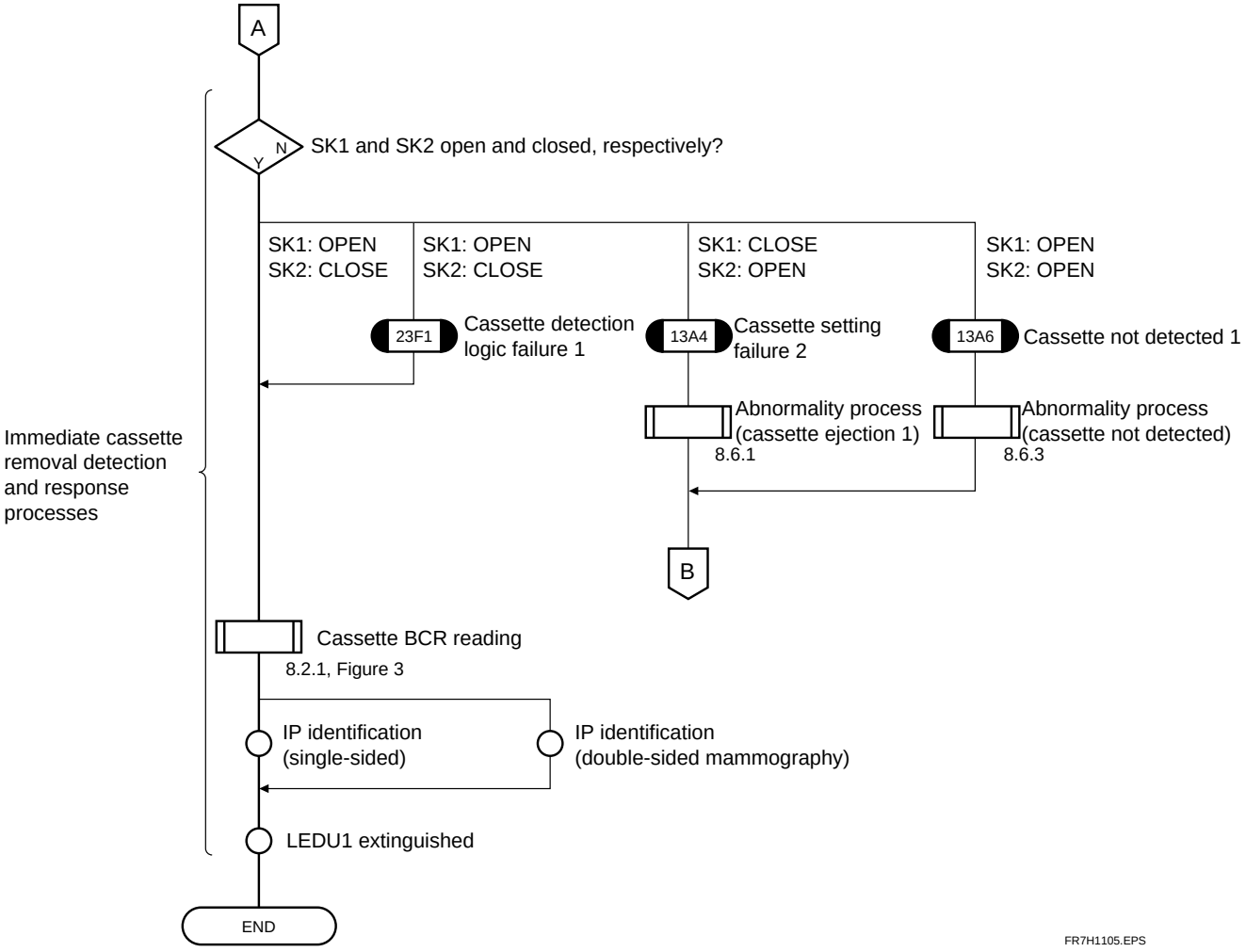


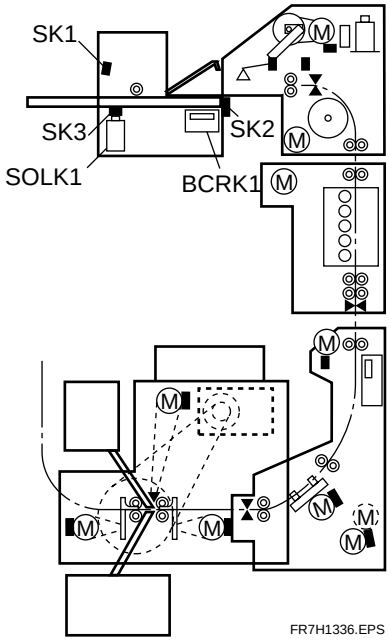
Table 8.2.1.1 Operation Parameters

Symbol	Description	Value
TK14	Hold timeout	0.5 sec
TK15	Wait for hold retry	2 sec
NK12	Hold retry	5 times

TR7H1098.EPS


A
SK1 and SK2 open and closed, respectively?
N
Y
SK1: OPEN
SK2: CLOSE
SK1: OPEN
SK2: CLOSE
SK1: CLOSE
SK2: OPEN
SK1: OPEN
SK2: OPEN
23F1
Cassette detection logic failure 1
13A4
Cassette setting failure 2
13A6
Cassette not detected 1
Abnormality process (cassette ejection 1)
8.6.1
Abnormality process (cassette not detected)
8.6.3
B
Immediate cassette removal detection and response processes
Cassette BCR reading
8.2.1, Figure 3
IP identification (single-sided)
IP identification (double-sided mammography)
LEDU1 extinguished
END
FR7H1105.EPS

<I/O arrangement diagram>



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<I/O list>

Symbol	Name	Type	Function/remarks
SK1	Cassette ejection sensor	PI (5 mm)	Actuates upon cassette ejection.
SK2	Cassette IN sensor	Microswitch	The state of this sensor is ANDed with that of the SK3 to achieve recognition.
SK3	Cassette hold sensor	PI (5 mm)	Actuates upon completion of a cassette hold operation.
BCRK1	Barcode reader	————	Provides mammography cassette identification.
SOLK1	Cassette hold solenoid	Power down solenoid	When turned ON, this solenoid retracts the cassette hold pin.
LEDU1	Readiness for cassette insertion	LED	Indicates the readiness for cassette insertion.

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<Sensor ON/OFF status>

SK1/SK3

OFF: Open (not blocked)　　ON: Closed (blocked)

SK2

OFF: Open　　ON: Close

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<Figure 2 Cassette hold release flowchart>

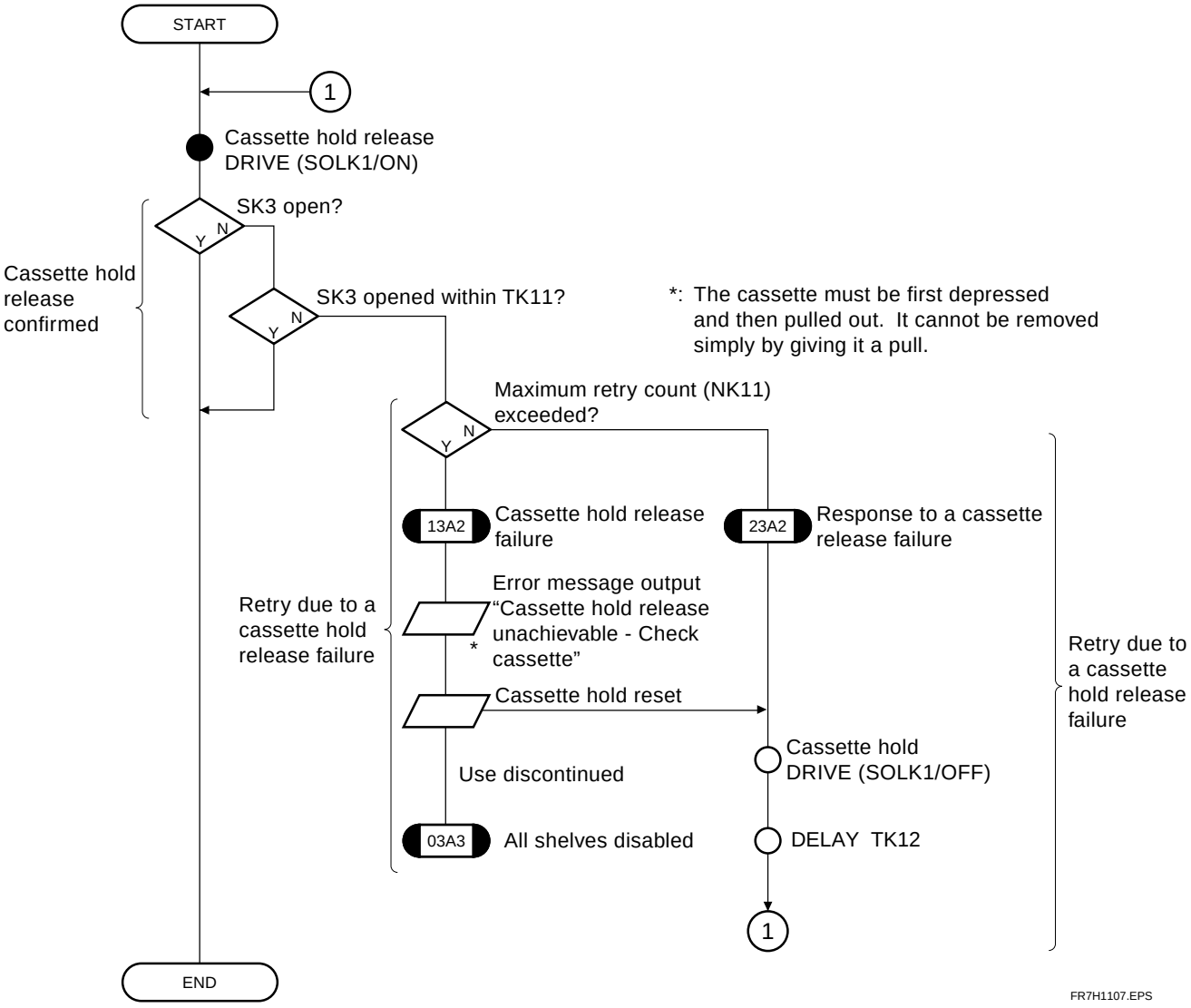

Table 8.2.1.2 Operation Parameters

Symbol	Description	Value
TK11	Hold release timeout	0.5 sec
TK12	Wait for hold release retry	2 sec
NK11	Hold release retry	5 times

TR7H1099.EPS

<Figure 3 Cassette BCR reading flowchart>

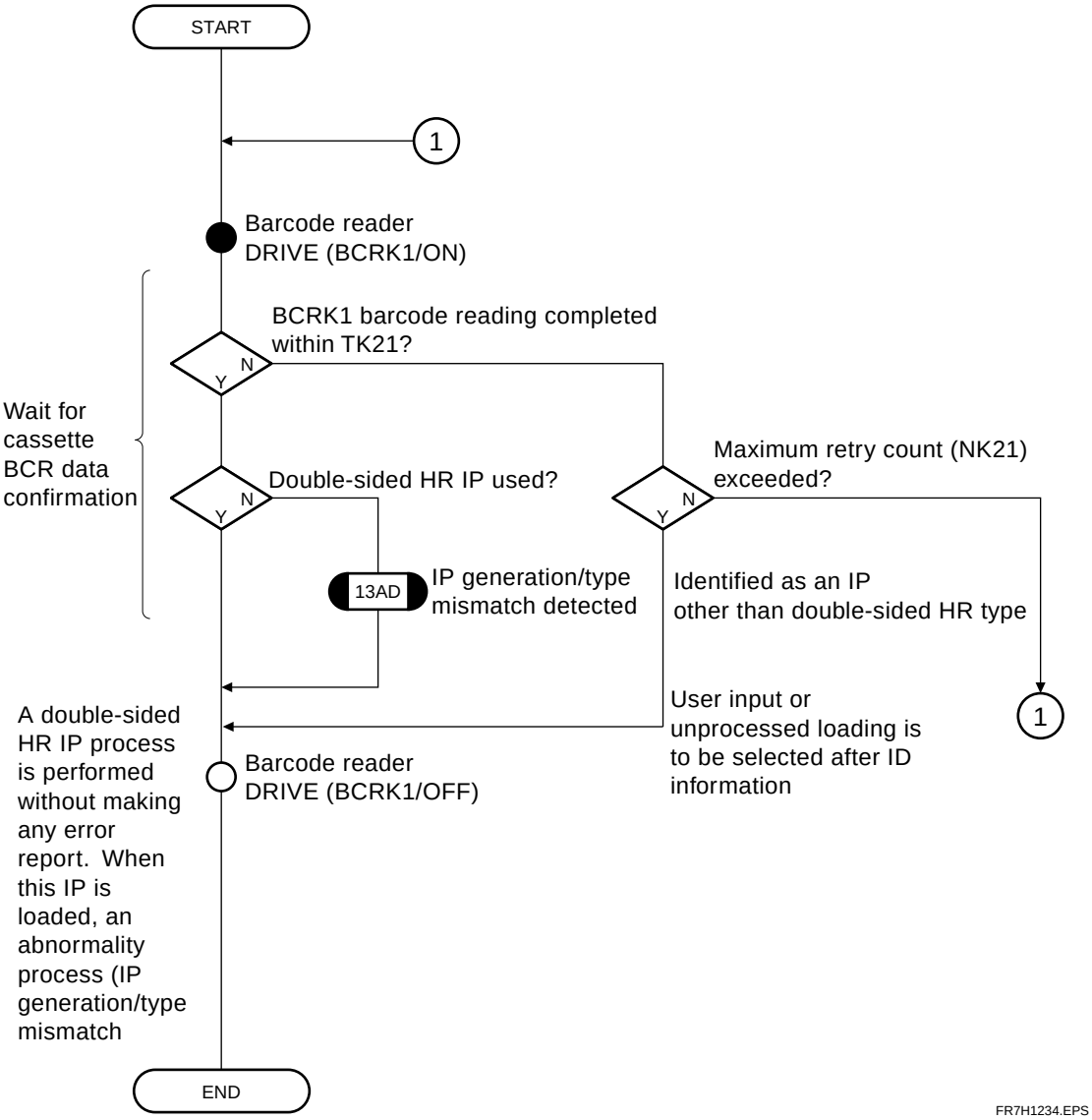

Table 8.2.1.3 Operation Parameters

Symbol	Description	Value
TK21	Cassette BCR reading timeout	1 sec
NK21	Cassette BCR reading retry	1 time

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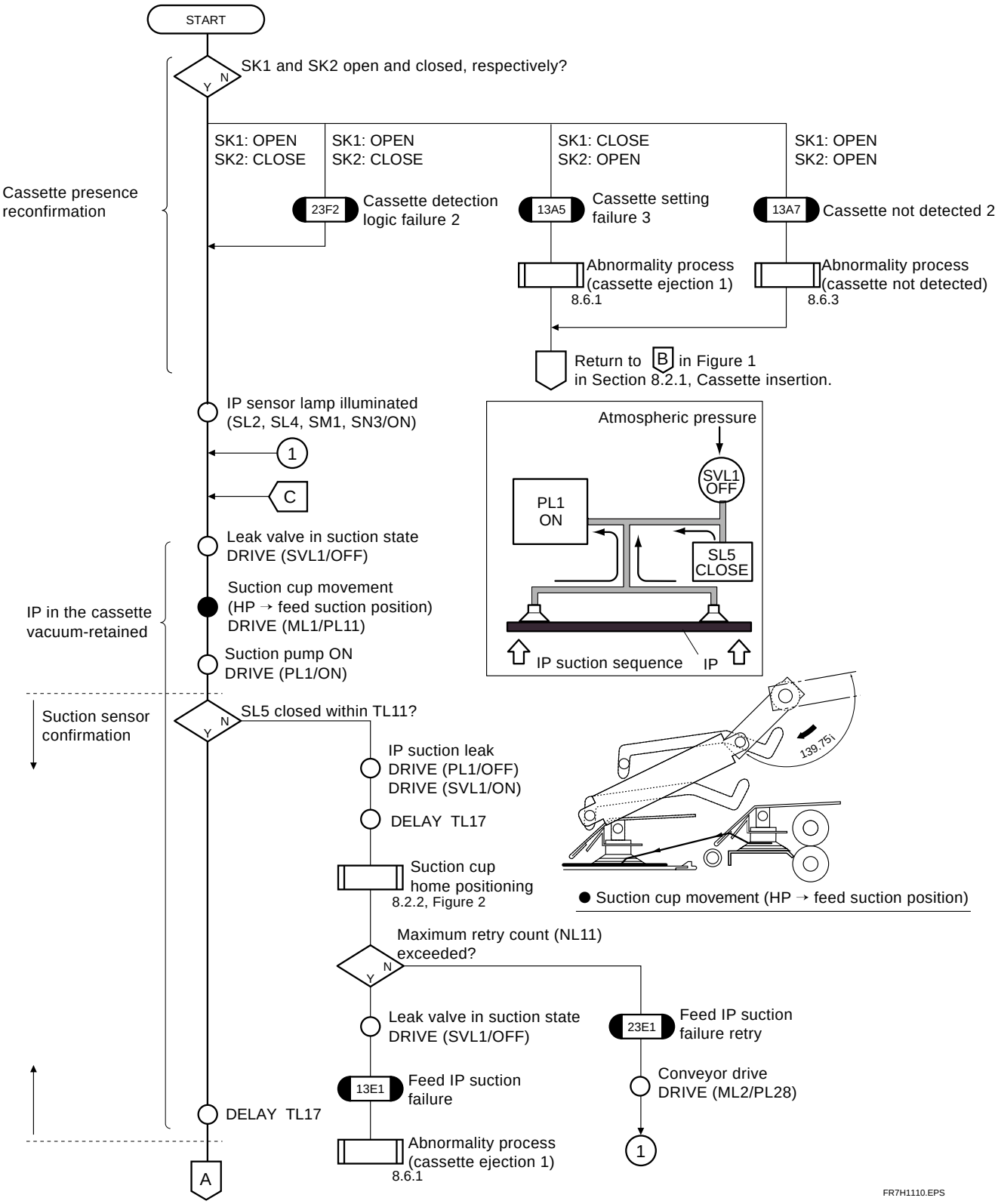
8.2.2 IP feed

Sequence overview

The operations in this sequence are performed by the IP removal unit.

To feed the IP to the conveyance path, the suction cup assembly vacuum-retains the IP in the cassette. The vacuum-retained IP is then removed from the cassette and nipped by the grip roller in the IP removal unit.

<Figure 1 IP feed flowchart>



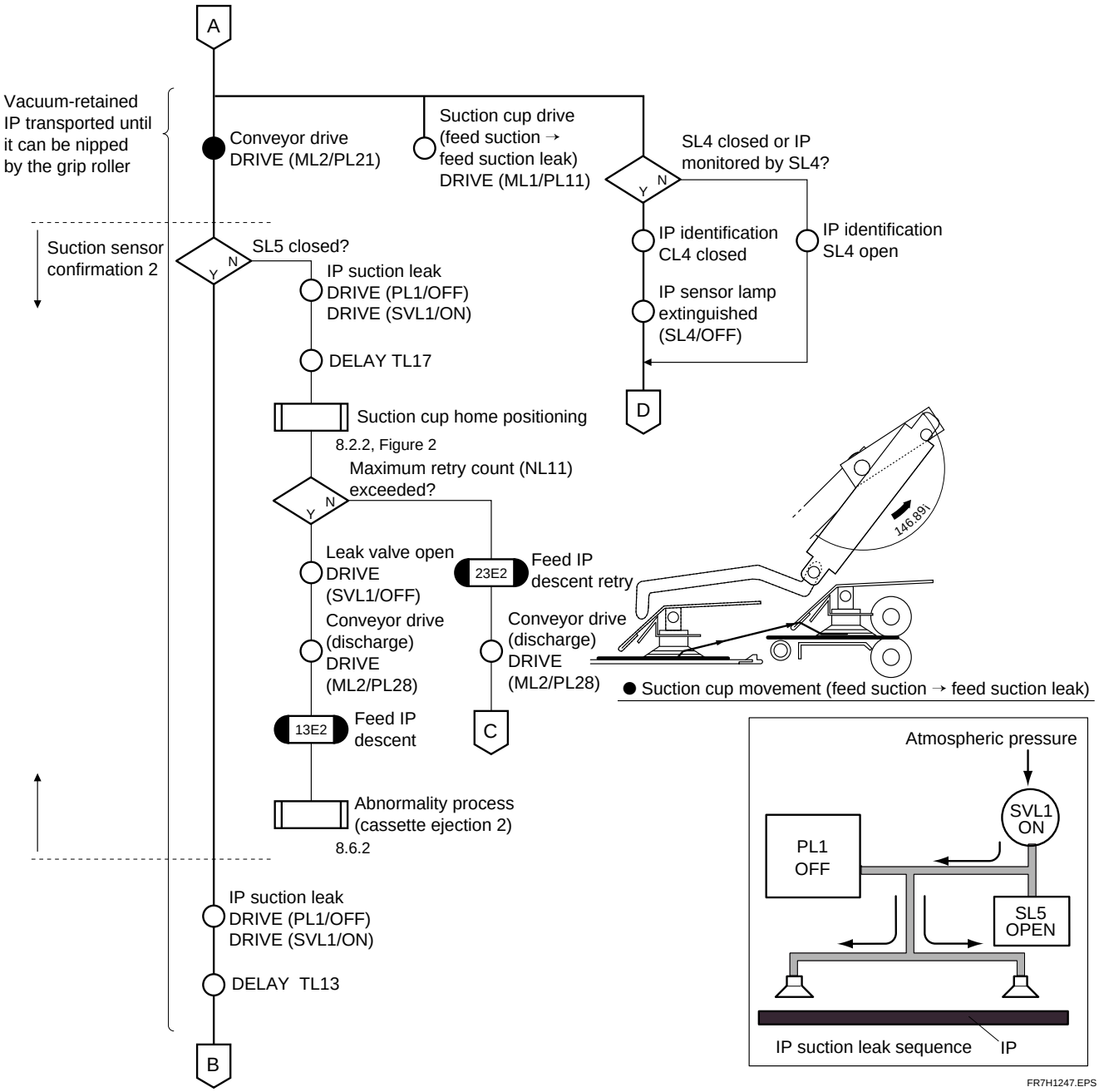
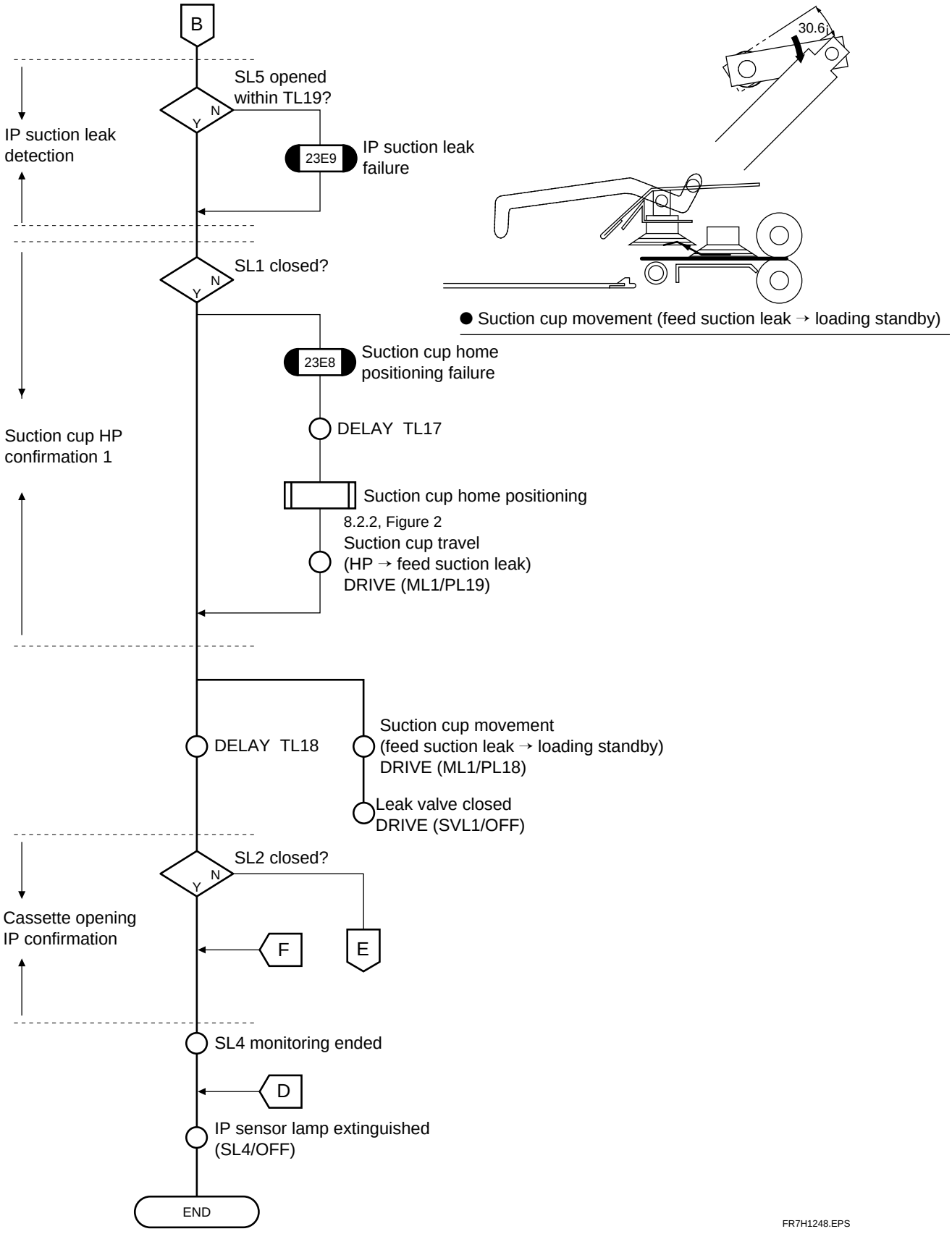


Table 8.2.2.1 Operation Parameters

Symbol	Description	Value
NL11	Feed suction retry	3 times
PL11	Suction cup movement (HP → feed suction)	CW 505 P
PL28	Conveyance (discharge)	CW 5400 P
TL11	Feed suction timeout	1 sec
TL13	Wait for feed leak	0.1 sec
TL17	Wait for next operation	0.1 sec

TR7H1151.EPS


B
SL5 opened within TL19?
N
Y
IP suction leak detection
23E9
IP suction leak failure
SL1 closed?
N
Y
23E8
Suction cup home positioning failure
DELAY TL17
Suction cup HP confirmation 1
Suction cup home positioning
8.2.2, Figure 2
Suction cup travel (HP → feed suction leak) DRIVE (ML1/PL19)
DELAY TL18
Suction cup movement (feed suction leak → loading standby) DRIVE (ML1/PL18)
Leak valve closed DRIVE (SVL1/OFF)
SL2 closed?
N
Y
Cassette opening IP confirmation
F
E
SL4 monitoring ended
D
IP sensor lamp extinguished (SL4/OFF)
END
30.6
● Suction cup movement (feed suction leak → loading standby)
FR7H1248.EPS

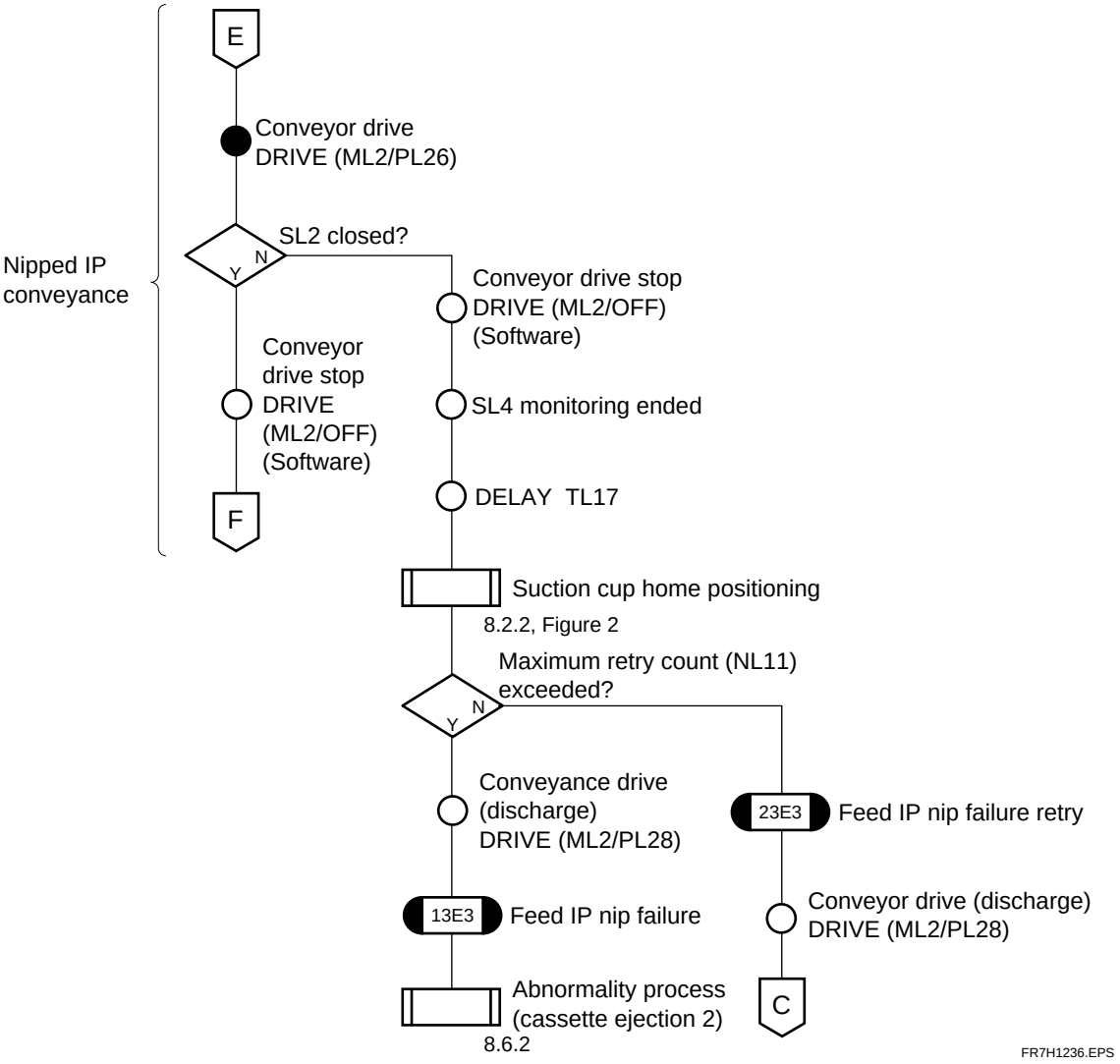


Table 8.2.2.2 Operation Parameters

Symbol	Description	Value
NL11	Feed suction retry	3 times
PL18	Suction cup movement (feed leak → load standbu)	CCW 110 P
PL19	Suction cup movement (HP → feed leak)	CCW 25 P
PL26	Conveyance (grip retry)	0xFFFFFF
PL28	Conveyance (discharge)	CW 5400 P
TL17	Wait for next operation	0.1 sec
TL18	Wait for feed	0.05 sec
TL19	Wait for leak	5 sec

0xFFFFFF: Infinitely CCW

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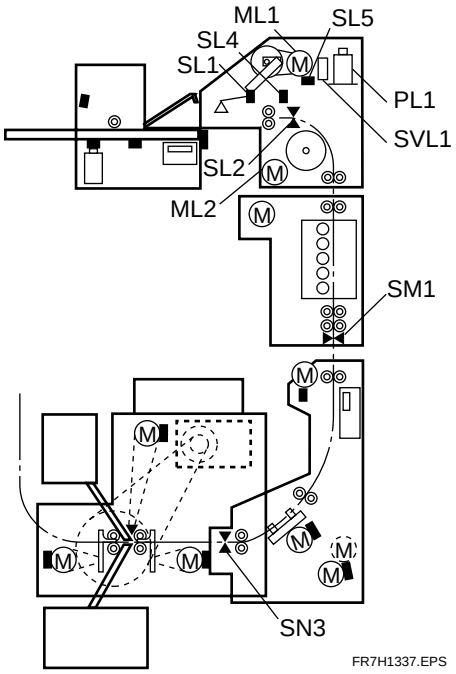
<I/O arrangement diagram>



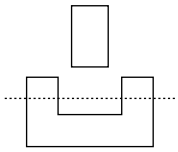
<I/O list>

Symbol	Name	Type	Function/remarks
ML1	Suction cup driving motor	Pulse motor	Opens the cassette rear cover and moves a roller.
ML2	IP transport motor	Pulse motor	Conveys the IP.
PL1	IP suction pump	DC pump	When turned ON, this pump produces a vacuum.
SL1	Suction cup HP sensor	PI (5mm)	IP removal arm HP position detection sensor
SL2	Cassette inlet IP sensor	PI (19mm)	IP transport sensor
SL4	Inch/metric sensor	Reflection type	Determines the IP width.
SL5	Suction sensor	Suction sensor	IP suction sensor
SM1	Before-BCR IP sensor	PI (19mm)	IP transport sensor
SN3	Side-positioning IP sensor	PI (19mm)	IP transport sensor
SVL1	IP leak valve	Solenoid valve	When turned ON, this valve provides suction leak.

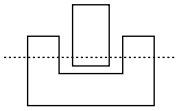
TR7H1101.EPS

<I/O sensor ON/OFF>

SL1

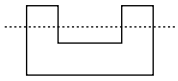


OFF: Open (not blocked)

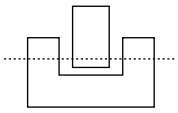


ON: Closed (blocked)

SL2/SM1/SN3

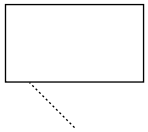


OFF: Open (IP not found)

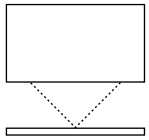


ON: Closed (IP found)

SL4



OFF (0): Open



ON (1): Closed

FR7H1253.EPS

<Figure 2 Suction cup HP flowchart>

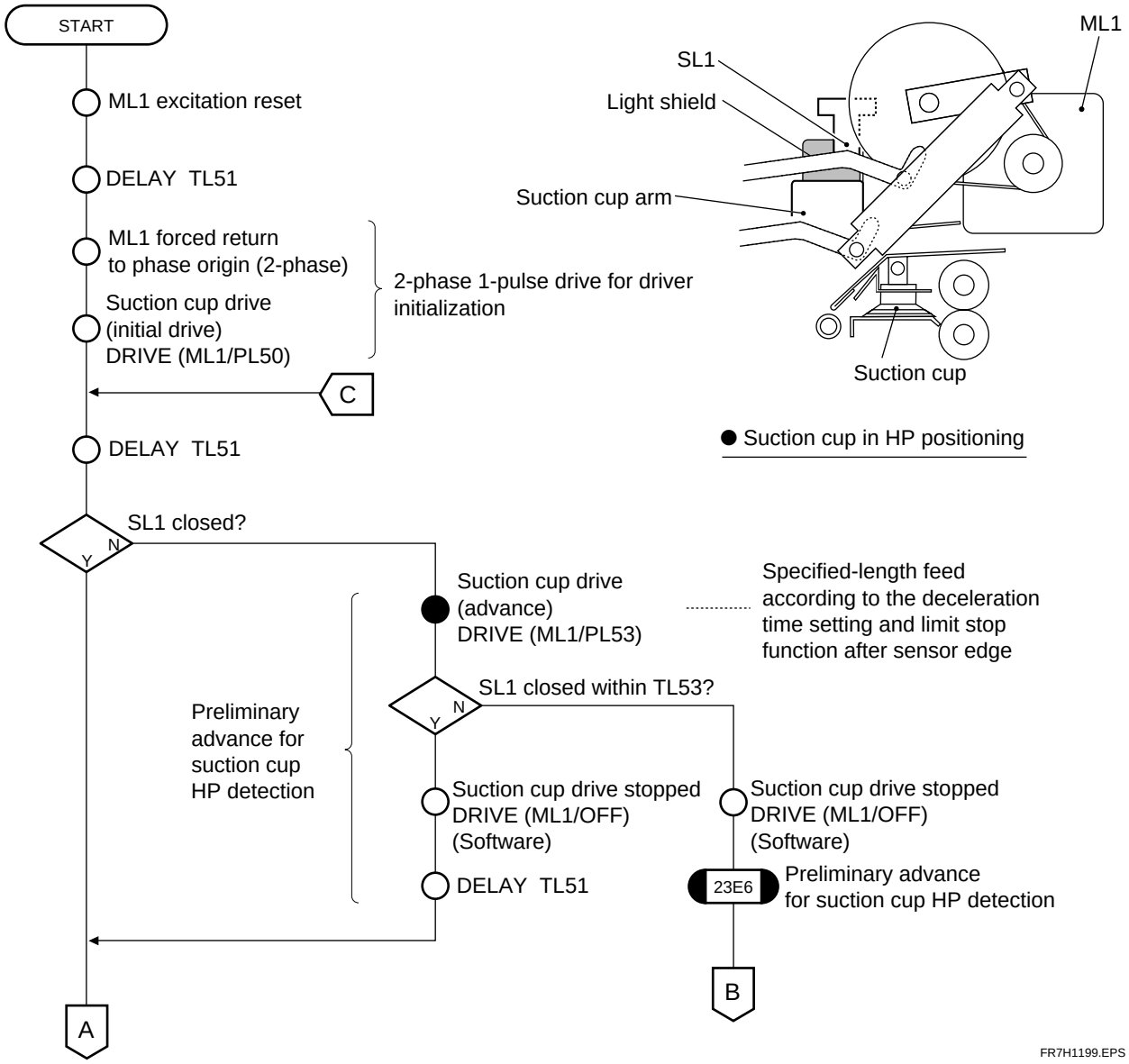
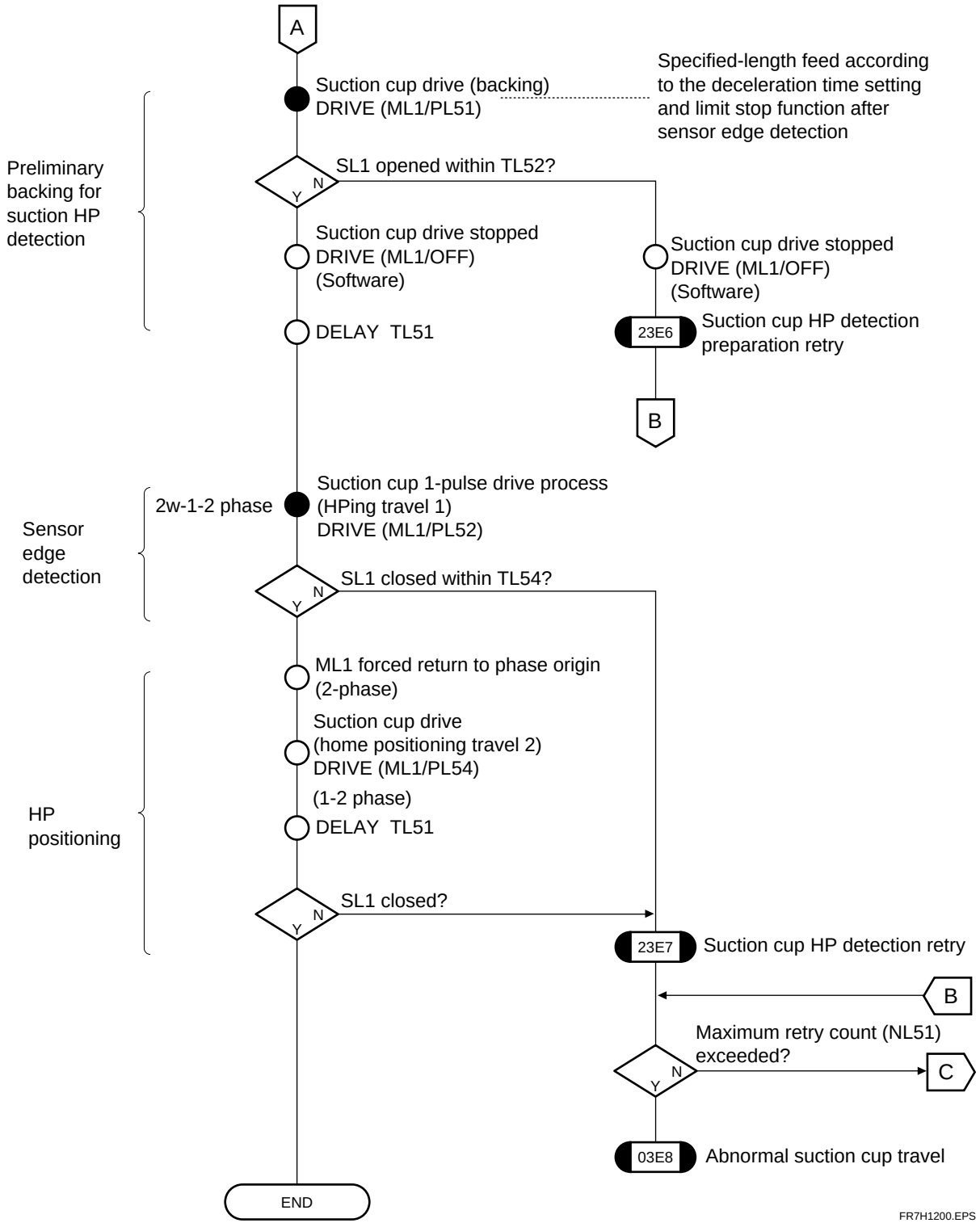


Table 8.2.2.3 Operation Parameters

Symbol	Description	Value
NL51	Suction HP retry	2 times
PL50	Suction cup movement (initial driving)	CW 1 P
PL51	Suction cup movement (HP return)	0x7FFFFF
PL52	Suction cup 1-pulse driving (HP movement 1)	CCW 1 P
PL53	Suction cup movement (HP positioning)	0xFFFFFF
PL54	Suction cup movement (HP movement 2)	CCW 20 P
TL51	Wait for suction cup HP settlement	0.5 sec
TL52	Suction cup HP detection standby timeout	1.3 sec
TL53	Suction HP detection timeout	5.3 sec
TL54	Suction HP 1-pulse driving timeout	20 sec

0x7FFFFF: Infinitely CW
0xFFFFFF: Infinitely CCW

TR7H1153.EPS


A
Suction cup drive (backing)
DRIVE (ML1/PL51)
Specified-length feed according to the deceleration time setting and limit stop function after sensor edge detection
Preliminary backing for suction HP detection
SL1 opened within TL52?
N
Y
Suction cup drive stopped
DRIVE (ML1/OFF)
(Software)
Suction cup drive stopped
DRIVE (ML1/OFF)
(Software)
DELAY TL51
23E6
Suction cup HP detection preparation retry
B
2w-1-2 phase
Suction cup 1-pulse drive process
(HPing travel 1)
DRIVE (ML1/PL52)
Sensor edge detection
SL1 closed within TL54?
N
Y
ML1 forced return to phase origin
(2-phase)
Suction cup drive
(home positioning travel 2)
DRIVE (ML1/PL54)
(1-2 phase)
HP positioning
DELAY TL51
SL1 closed?
N
Y
23E7
Suction cup HP detection retry
B
Maximum retry count (NL51) exceeded?
N
Y
C
03E8
Abnormal suction cup travel
END
FR7H1200.EPS

8.2.3 IP length measurement

<Figure 1 IP length measurement flowchart>

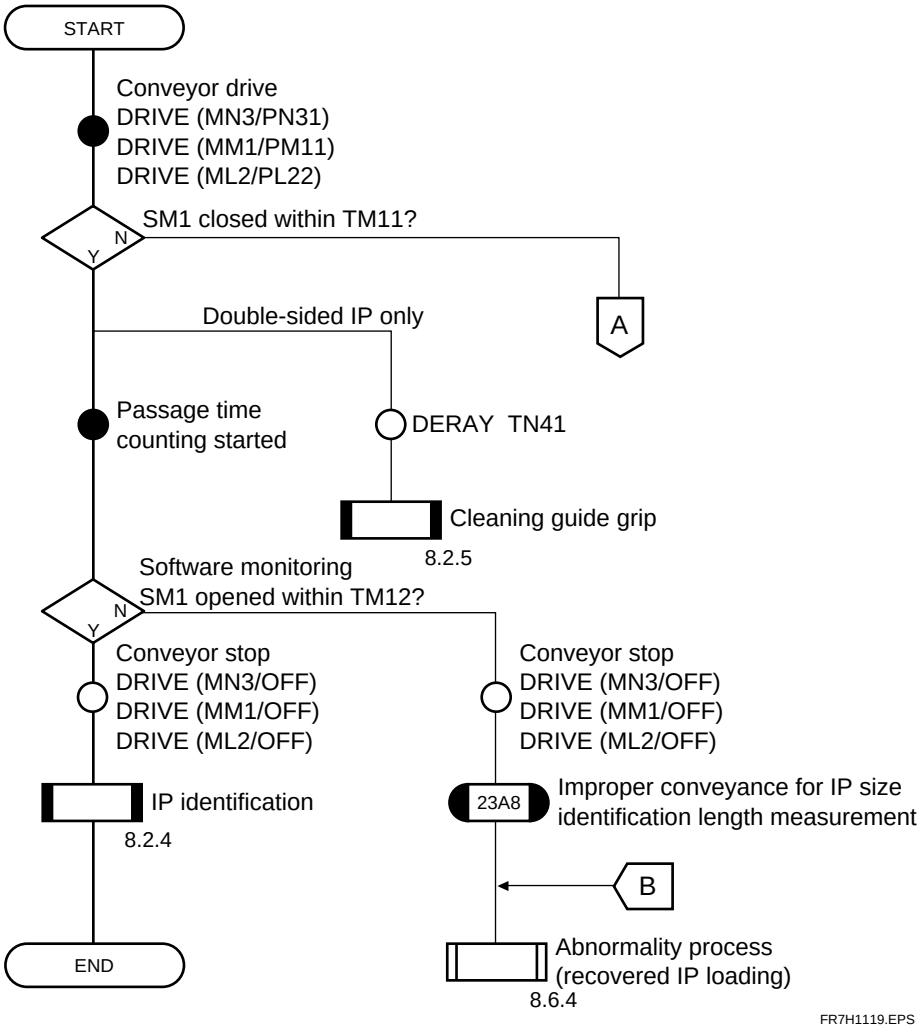
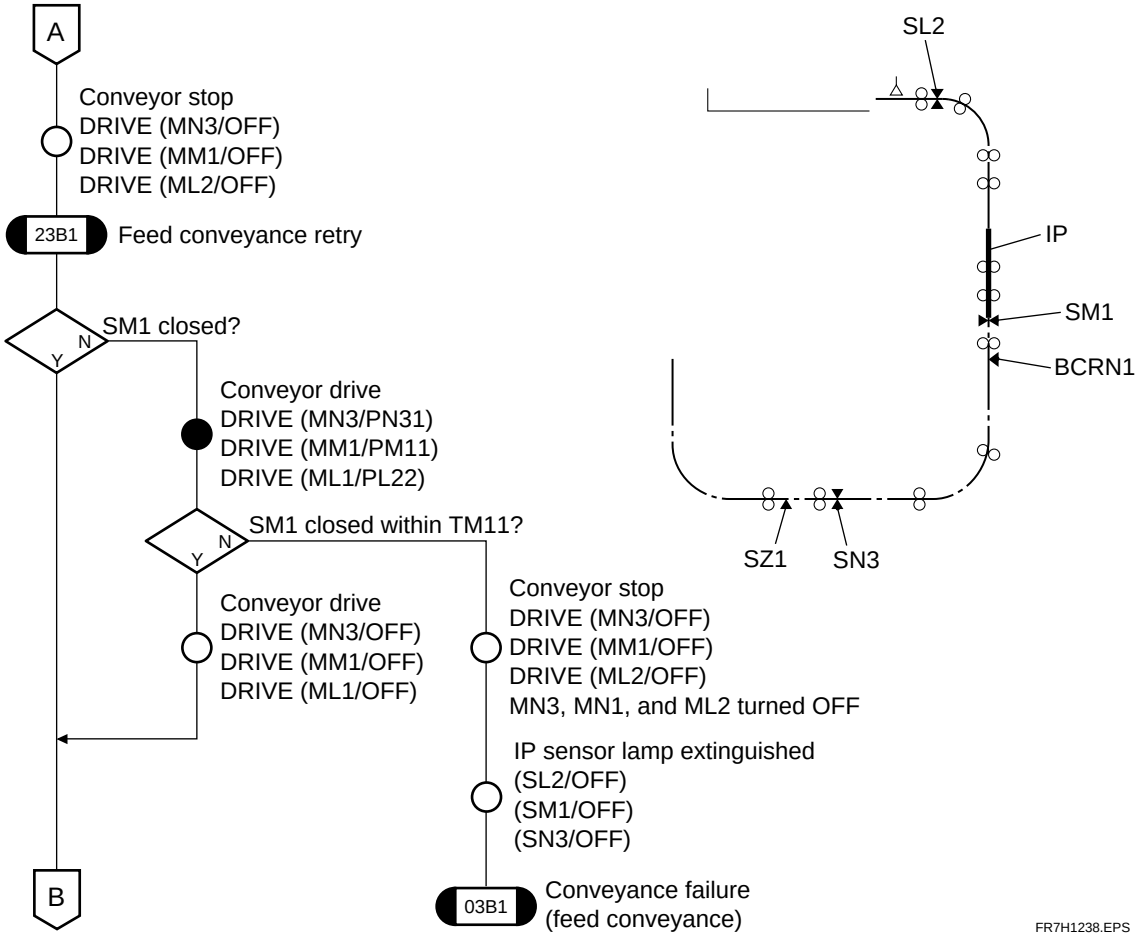


Table 8.2.3.1 Operation Parameters

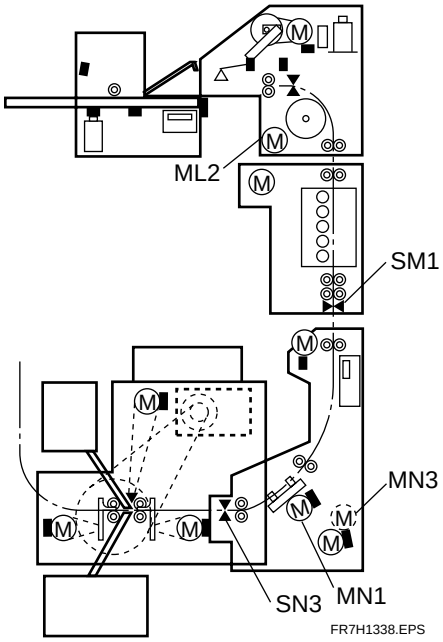
Symbol	Description	Value
PL22	Conveyance (feed)	0xFFFFFF
PM11	SPR conveyance (feed)	0xFFFFFF
PN31	Conveyance (feed)	0xFFFFFF
TM11	Feed conveyance timeout	3.5 sec
TM12	IP length mesurement timeout	2.9 sec
TN41	Wait for cleaning guide operation	0.04 sec

0xFFFFFF: Infinitely CCW

TR7H1155.EPS


A
Conveyor stop
DRIVE (MN3/OFF)
DRIVE (MM1/OFF)
DRIVE (ML2/OFF)
23B1
Feed conveyance retry
SM1 closed?
N
Y
Conveyor drive
DRIVE (MN3/PN31)
DRIVE (MM1/PM11)
DRIVE (ML1/PL22)
SM1 closed within TM11?
N
Y
Conveyor drive
DRIVE (MN3/OFF)
DRIVE (MM1/OFF)
DRIVE (ML1/OFF)
Conveyor stop
DRIVE (MN3/OFF)
DRIVE (MM1/OFF)
DRIVE (ML2/OFF)
MN3, MN1, and ML2 turned OFF
IP sensor lamp extinguished
(SL2/OFF)
(SM1/OFF)
(SN3/OFF)
03B1
Conveyance failure
(feed conveyance)
B
SL2
IP
SM1
BCRN1
SZ1
SN3
FR7H1238.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
ML2	IP transport motor	Pulse motor	Conveys the IP.
MM1	IP transport motor	Pulse motor	Conveys the IP.
MN3	IP transport motor	Pulse motor	Conveys the IP.
SM1	Before-BCR IP detection sensor	PI (19mm)	IP transport sensor
SN3	Side-positioning IP detection sensor	PI (19mm)	IP transport sensor

TR7H1102.EPS

<Sensor ON/OFF status>

SM1/SN3

OFF: Open (IP not found) ON: Closed (IP found) FR7H1254.EPS

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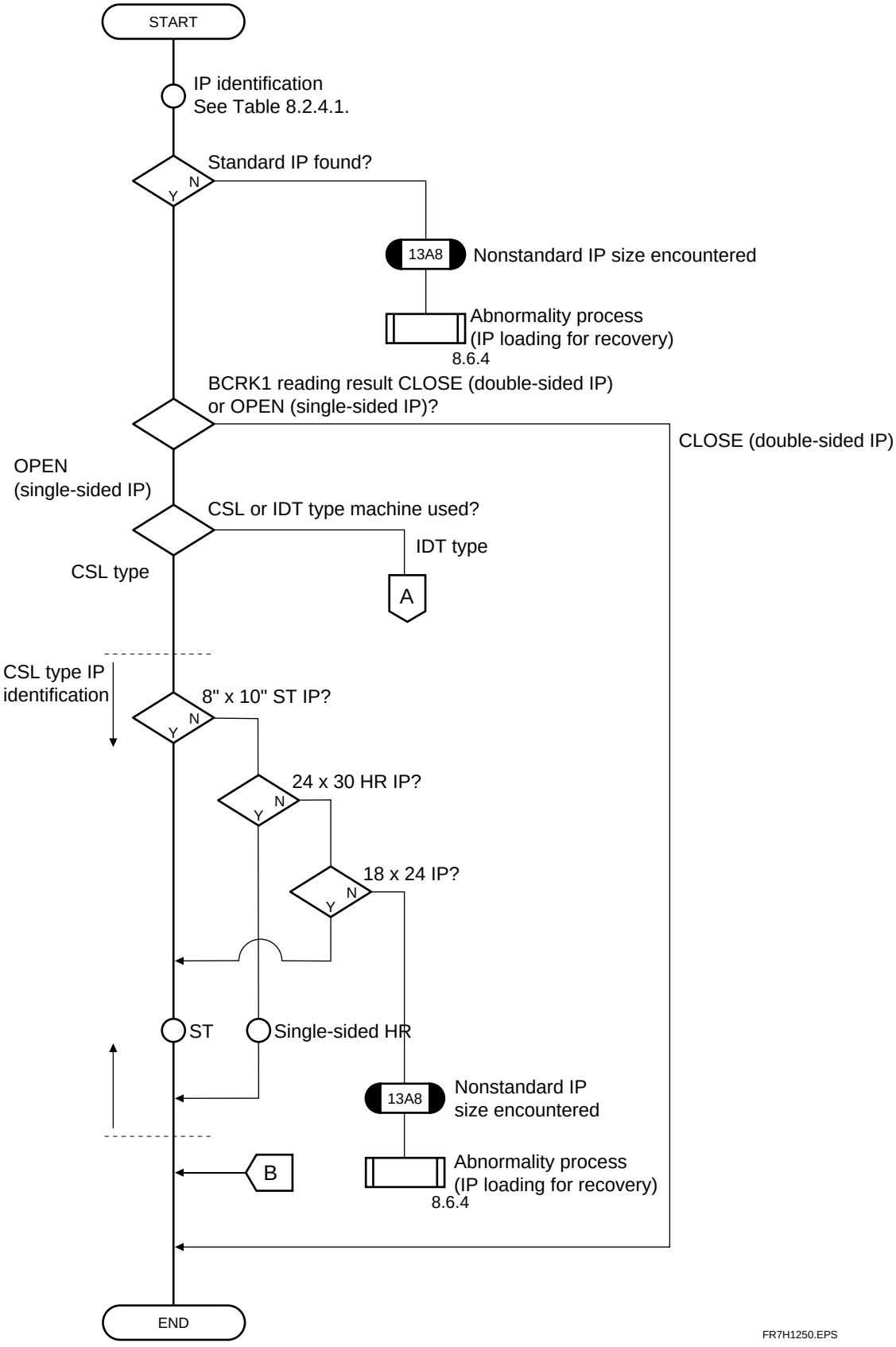
8.2.4 IP Identification

<Figure 1 IP identification flowchart>



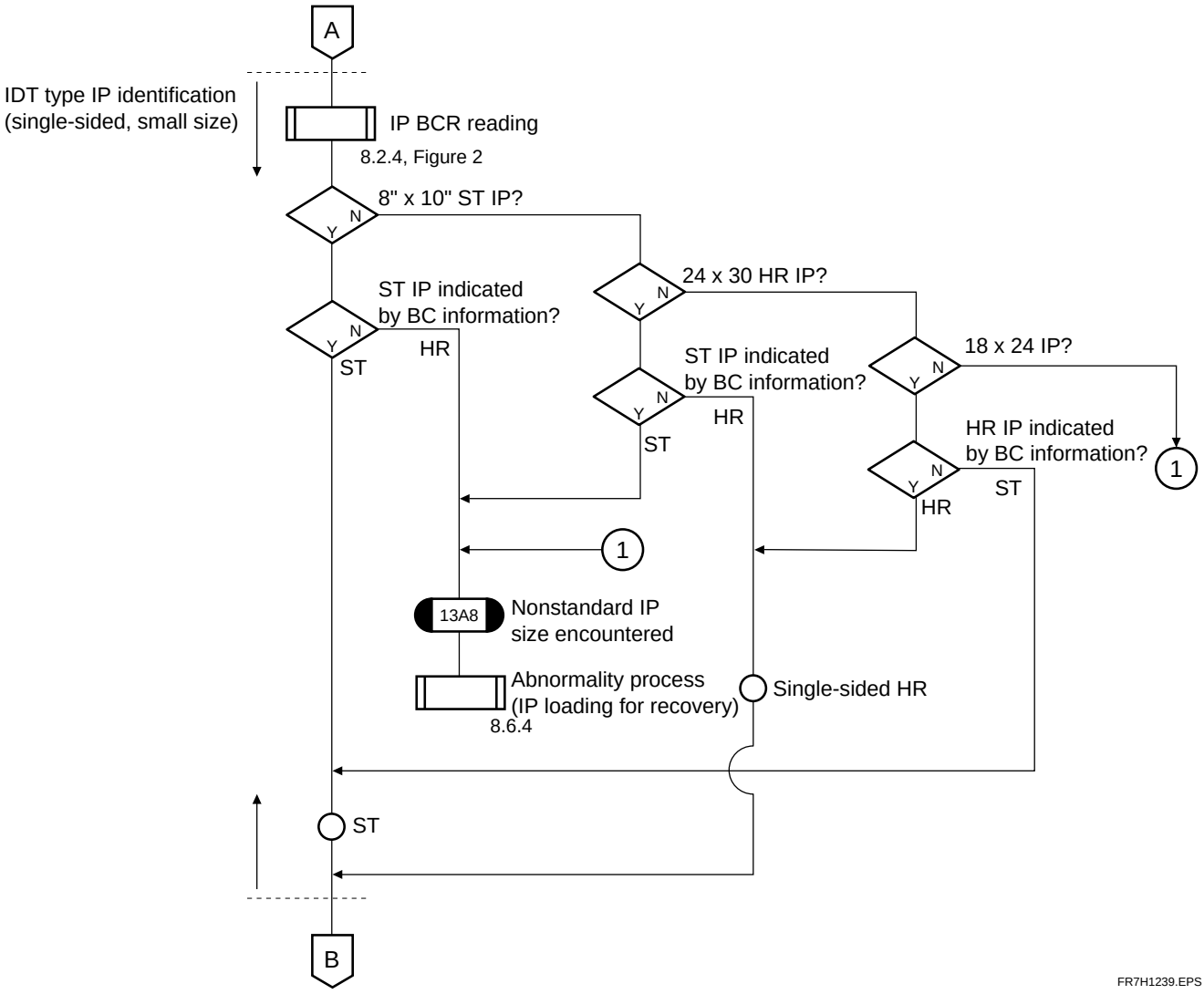
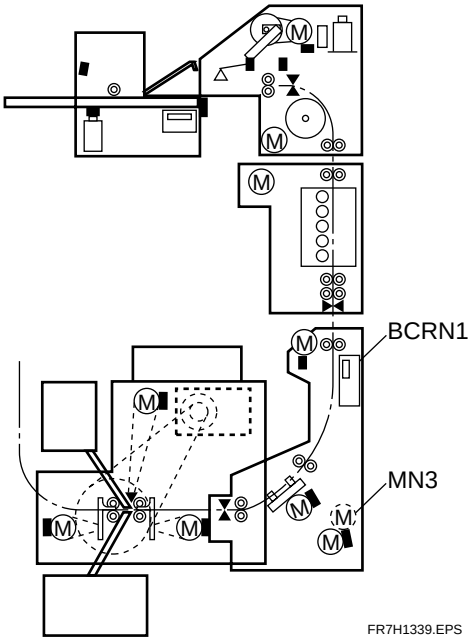


Table 8.2.4.1 IP Identification Conditions

IP type setting	Length x width (mm)	SL4 result	BCRK1 reading result	SM1 passage time (sec)			
				–TM21	TM21–TM22	TM22–TM23	TM23–TM24
				(–0.47)	(0.47–0.59)	(0.59–0.69)	(0.69–0.83)
14" x 17"	430x354	CLOSE	IP without a barcode or having a barcode other than the HR-BD No. type				❍
14" x 14"	354x354	CLOSE				❍	
10" x 12"	303x252	CLOSE			❍		
8" x 10"	201x252	CLOSE		❍			
18x24 ST	178x238	OPEN		❍			
24x30 ST	298x238	OPEN			❍		
18x24 HR single-sided	178x238	OPEN		❍			
24x30 HR single-sided	238x298	CLOSE		❍			
18x24 HR double-sided	176x238	OPEN	HR-BD No. type barcode label	❍			
24x30 HR double-sided	238x296	CLOSE		❍			

TR7H1208.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
MN3	IP transport motor	Pulse motor	Conveys the IP.
BCRN1	Barcode reader	CCD type	Recognizes the IP type/size.

TR7H1103.EPS

<Figure 2 IP BCR reading flowchart>

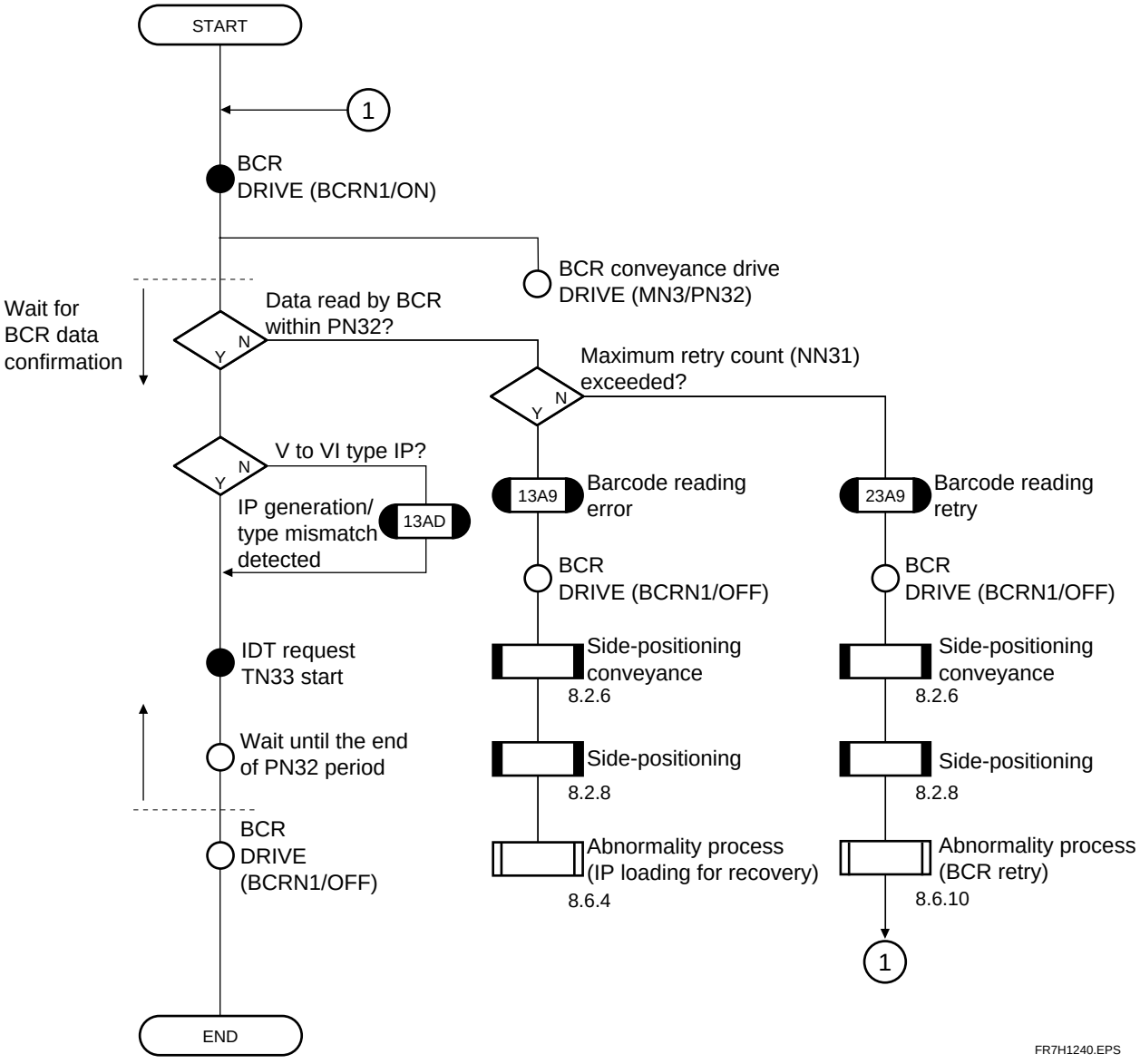


Table 8.2.4.2 Operation Parameters

Symbol	Description	Value
NN31	Side-positioning BCR retry	3 times
PN32	Conveyance (BCR)	CCW 972 P

TR7H1156.EPS

8.2.5 Cleaning guide grip

Sequence overview

The operation in this sequence is performed by the side-positioning conveyor.

The operation is performed to press the cleaning guide against the IP.

<Figure 1 Cleaning guide grip flowchart>

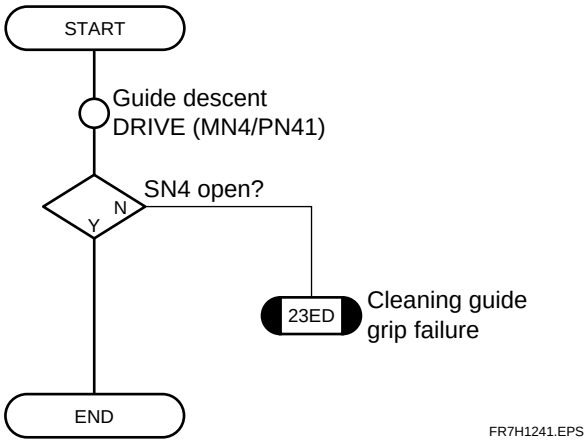
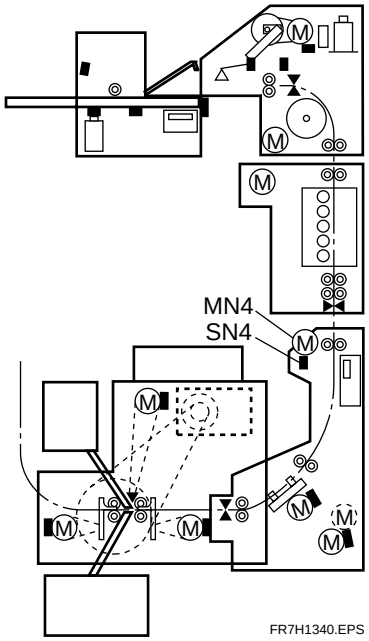


Table 8.2.5.1 Operation Parameters

Symbol	Description	Value
PN41	Cleaning guide grip	CCW 800 P

TR7H1157.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/Remarks
MN4	Cleaning guide driving motor	Pulse motor	Grips/releases the cleaning guide.
SN4	Cleaning guide HP sensor	PI (5mm)	Cleaning guide HP sensor

TR7H1104.EPS

<Sensor ON/OFF status>

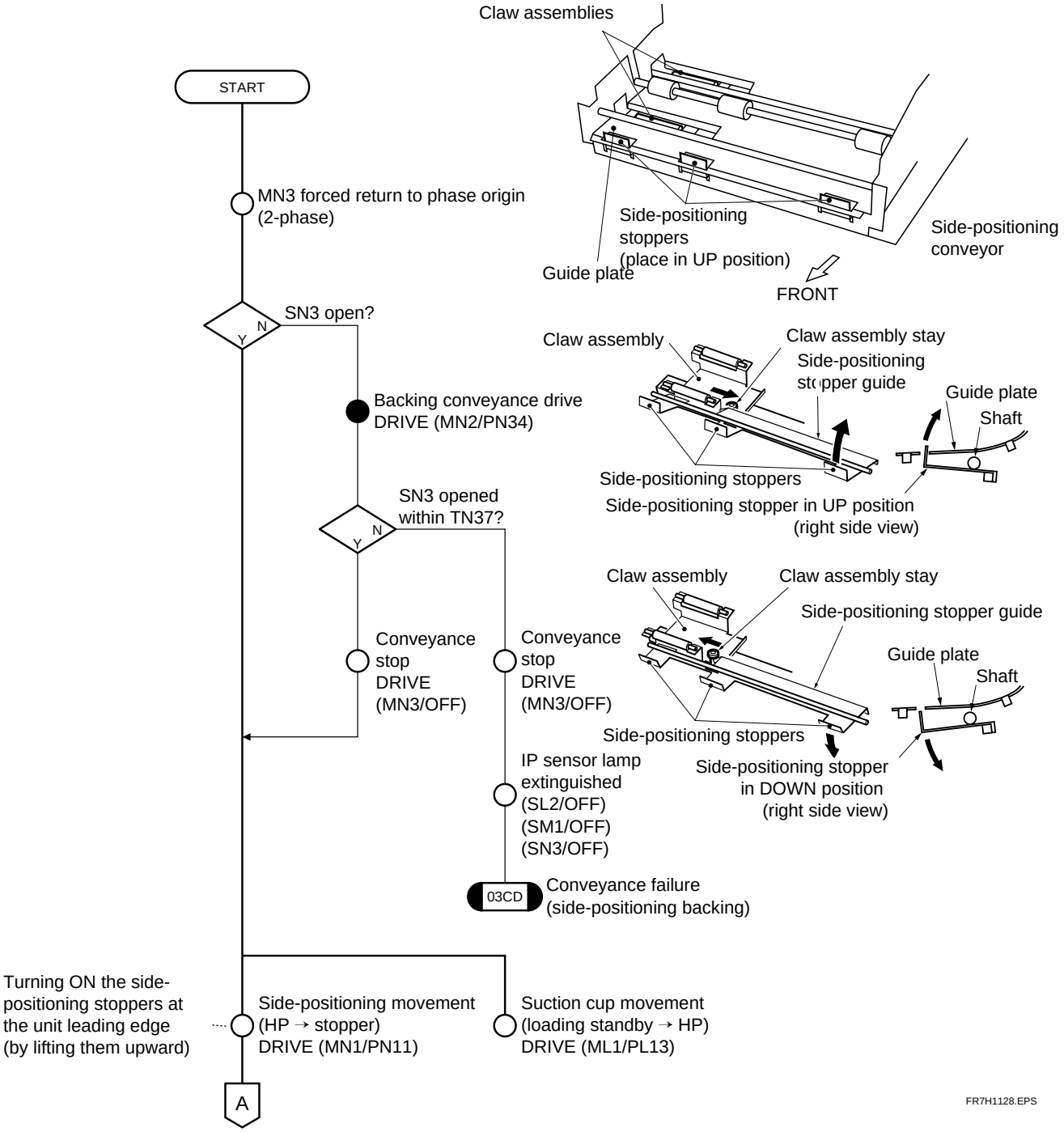
SN4

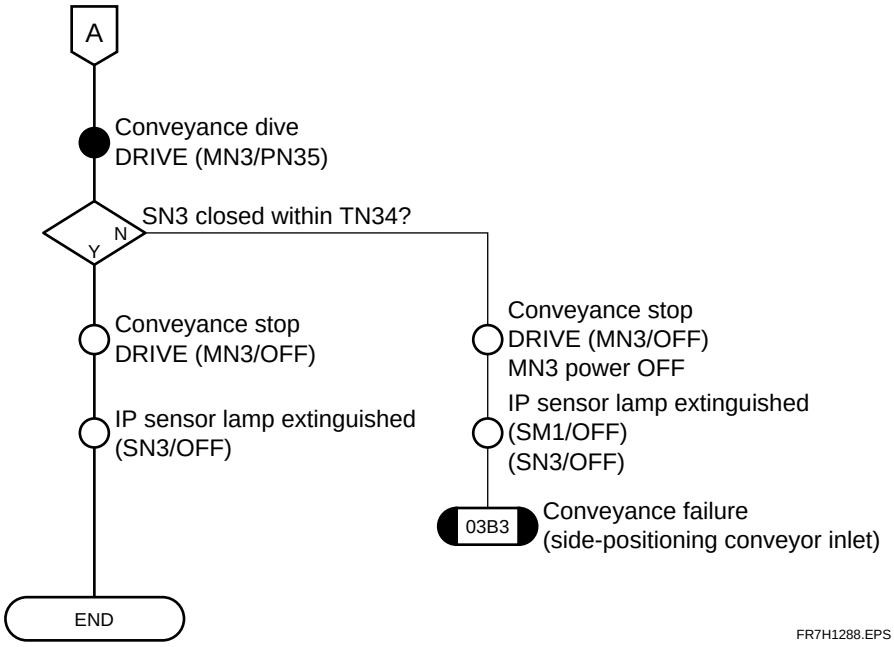
OFF: Open (IP not found)　　ON: Closed (IP found)

FR7H1256.EPS

8.2.6 Side-Positioning Conveyance

<Figure 1 Side-positioning conveyance flowchart>





FR7H1288.EPS

Table 8.2.6.1 Operation Parameters

Symbol	Description	Value
PL13	Suction cup movement (load standby → HP)	CW 135 P
PN11	Side-positioning (HP → stopper)	CW 64 P
TN37	Wait for side-positionig conveyor return	0.5 sec

TR7H1158.EPS

Table 8.2.6.2 Operation Parameters

Symbol	Description	Mode	14" x 17"	14" x 14"
PN34	Conveyance (side-positioning backing)	IDT	CW 540	CW 540
		CSL	CW 540	-

Unit: P

Table 8.2.6.3 Operation Parameters

Symbol	Description	Mode	14" x 17"	14" x 14"	10" x 12"	8" x 10"	1824ST	2430ST	1824HR	2430HR
TN34	Side-positioning timeout	IDT	2.19	2.40	2.28	2.57	2.63	2.29	2.63	2.46
		CSL	2.18	2.39	2.41	2.70	2.77	2.43	2.77	2.60

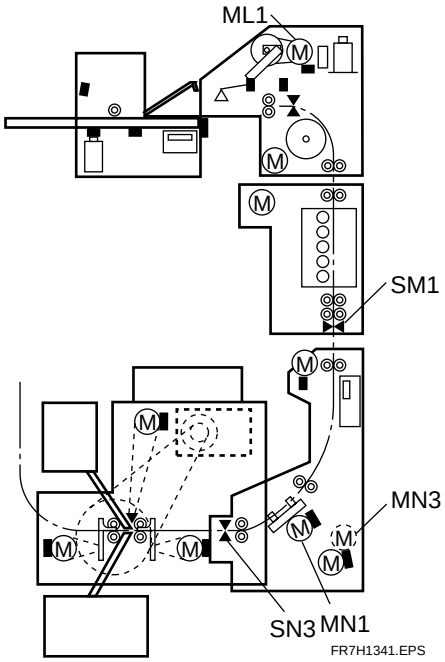
Unit: sec TR7H1210.EPS

Table 8.2.6.4 Operation Parameters

Symbol	Description	Mode	Value
PN35	Conveyance (side-positioning)	IDT	0xFFFFFF
		CSL	0xFFFFFF

0xFFFFFF: Infinitely CCW
Unit: P TR7H1211.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/Remards
ML1	Suction cup driving motor	Pulse motor	Opens the cassette rear cover and moves a roller.
MN1	Side-positioning motor	Pulse motor	Drives the side-positioning mechanism.
MN3	IP transport motor	Pulse motor	Conveys the IP.
SM1	Before-BCR IP sensor	PI (19mm)	IP transport sensor
SN3	Side-positioning IP sensor	PI (19mm)	IP transport sensor

TR7H1105.EPS

<Sensor ON/OFF status>

SM1/SN3

OFF: Open (IP not found) ON: Closed (IP found) FR7H1311.EPS

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8.2.7 Cleaning Guide Grip Release

<Figure 1 Cleaning guide grip release flowchart>

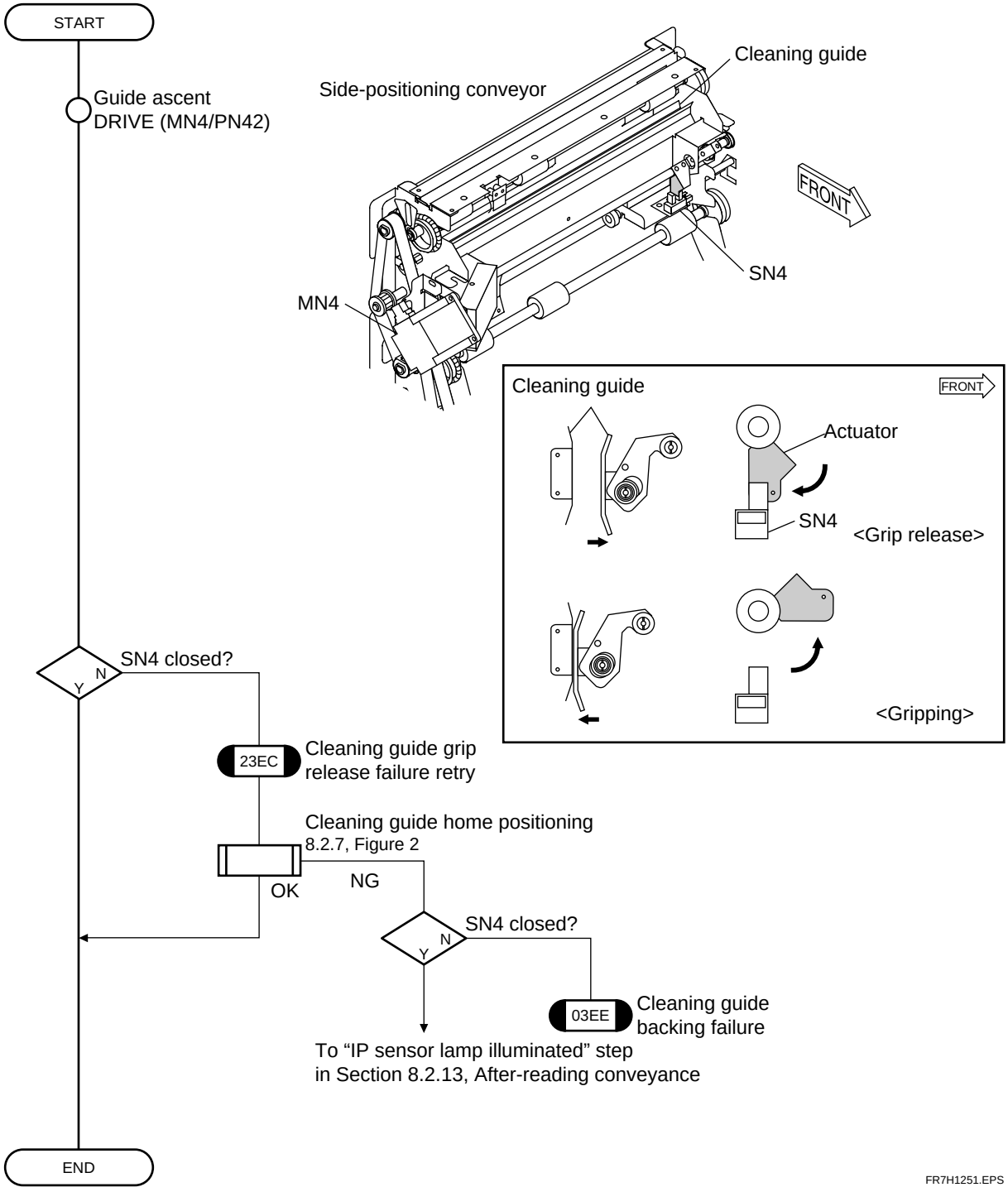
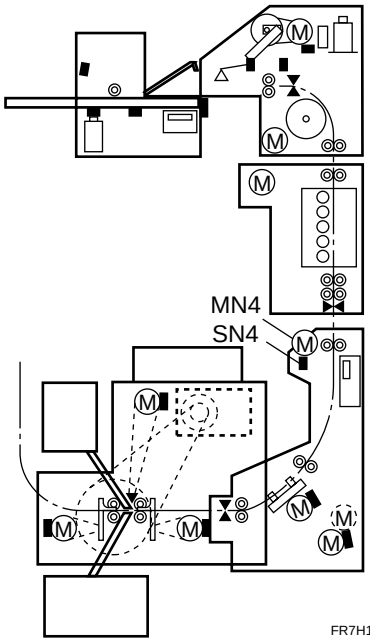


Table 8.2.7.1 Operation Parameters

Symbol	Description	Value
PN42	Cleaning guide grip release	CW 400 P

TR7H1159.EPS

<I/O arrangement diagram>



FR7H1342.EPS

<I/O list>

Symbol	Name	Type	Function/remards
MN4	Cleaning guide driving motor	Pulse motor	Grips/releases the cleaning guide.
SN4	Cleaning guide HP sensor	Pl (5mm)	Detects the cleaning guide HP.

TR7H1106.EPS

<Sensor ON/OFF status>

SN4

OFF: Open (not blocked)

ON: Closed (blocked)

FR7H1312.EPS

<Figure 2 Cleaning guide HPing flowchart>

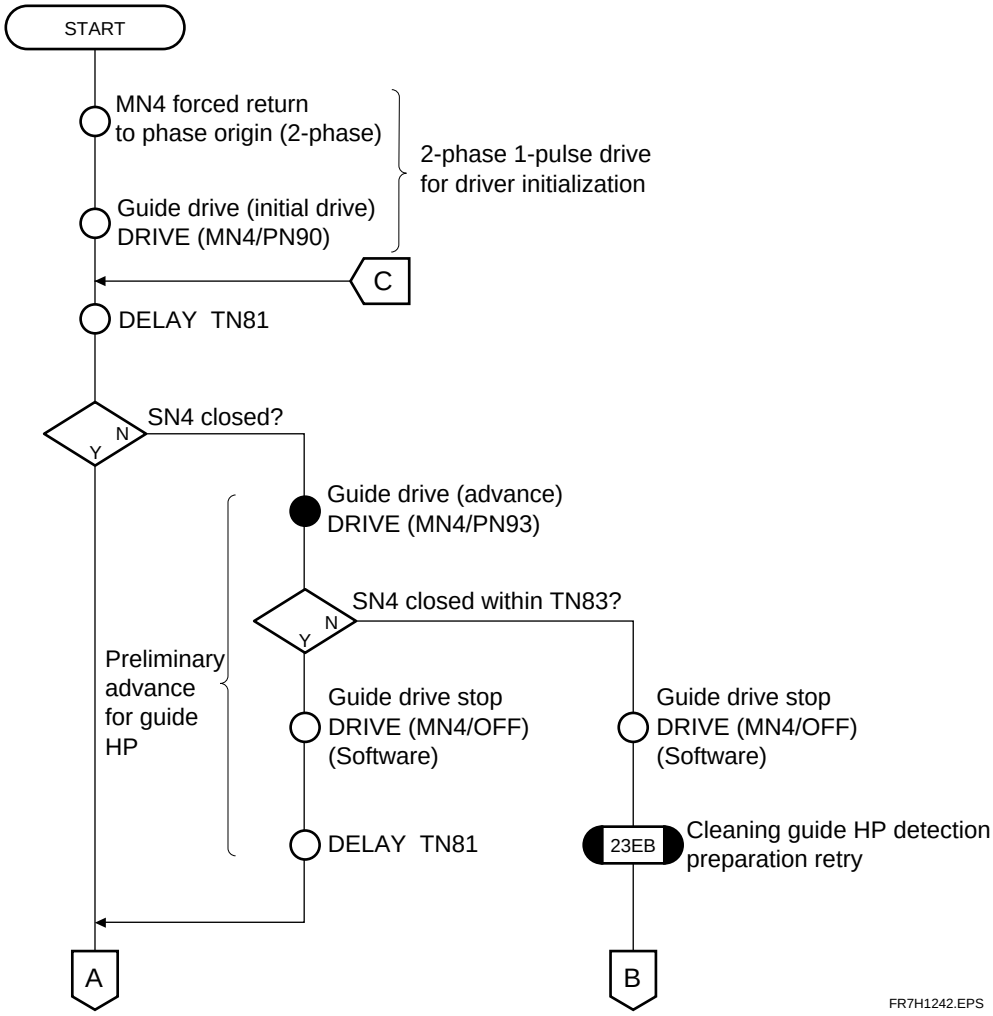
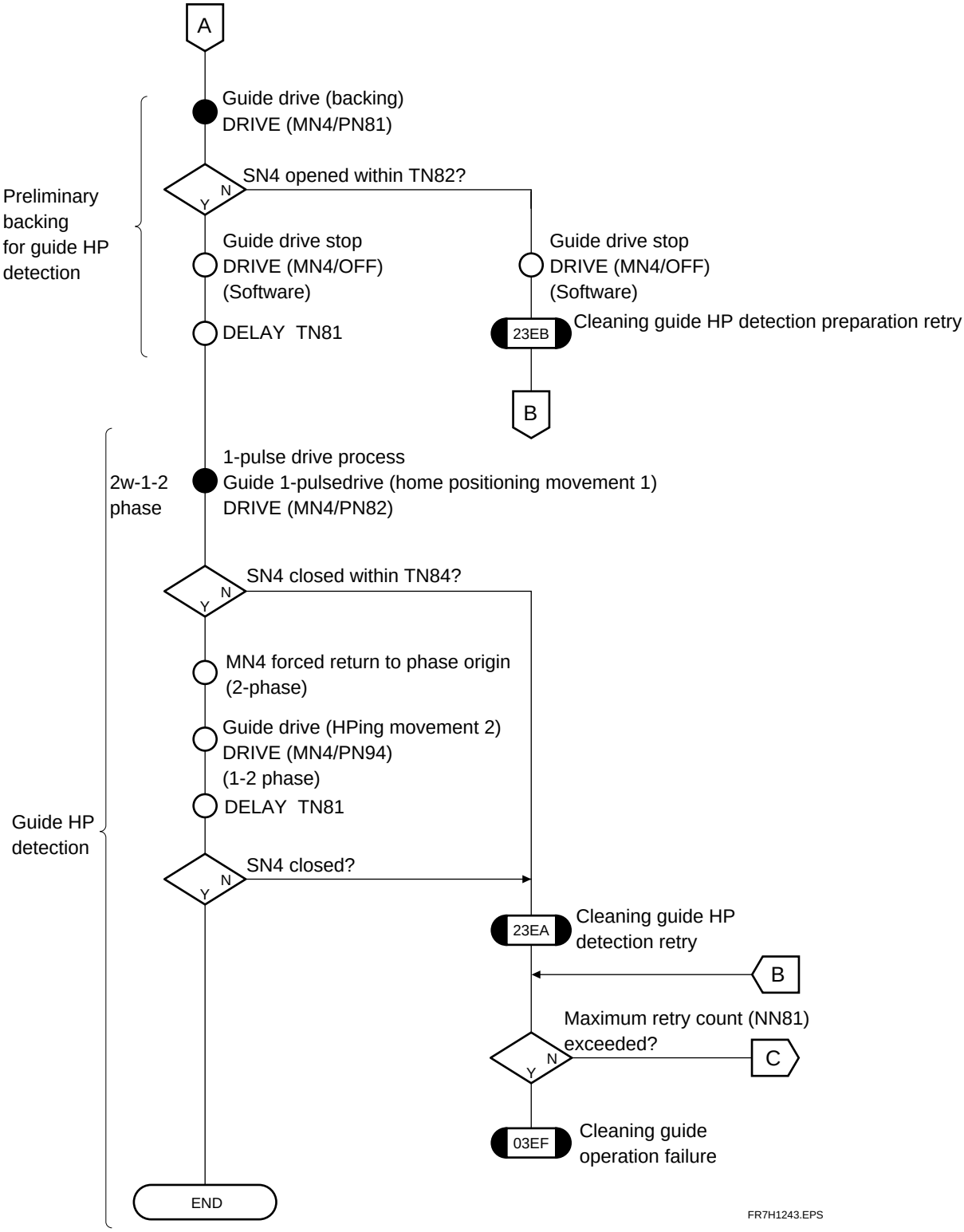


Table 8.2.7.2 Operation Parameters

Symbol	Discription	Value
NN81	Cleaning guide HP retry	3 times
PN81	Cleaning guide driving (HP return)	0xFFFFFF
PN82	Cleaning guide driving: Pulse driving (HP movement)	CW 1 P
PN93	Conveyance (erasure 1)	0x7FFFFF
PN94	Before erasure conveyance 2	CW 348 P
TN81	Wait for cleaning guide HP settlement	0.5 sec
TN82	Cleaning guide HP detection standby timeout	0.6 sec
TN83	Cleaning guide HP detection timeout	1.6 sec
TN84	Cleaning guide HP 1-pulse driving timeout	13.3 sec

0x7FFFFF: Infinitely CW
0xFFFFFF: Infinitely CCW

TR7H1160.EPS


A
Guide drive (backing)
DRIVE (MN4/PN81)
SN4 opened within TN82?
N
Y
Preliminary backing for guide HP detection
Guide drive stop
DRIVE (MN4/OFF)
(Software)
DELAY TN81
Guide drive stop
DRIVE (MN4/OFF)
(Software)
23EB
Cleaning guide HP detection preparation retry
B
1-pulse drive process
2w-1-2 phase
Guide 1-pulsedrive (home positioning movement 1)
DRIVE (MN4/PN82)
SN4 closed within TN84?
N
Y
MN4 forced return to phase origin
(2-phase)
Guide drive (HPing movement 2)
DRIVE (MN4/PN94)
(1-2 phase)
DELAY TN81
Guide HP detection
SN4 closed?
N
Y
23EA
Cleaning guide HP detection retry
B
Maximum retry count (NN81) exceeded?
N
Y
C
03EF
Cleaning guide operation failure
END
FR7H1243.EPS

8.2.8 Side-positioning

<Figure 1 Side-positioning flowchart>

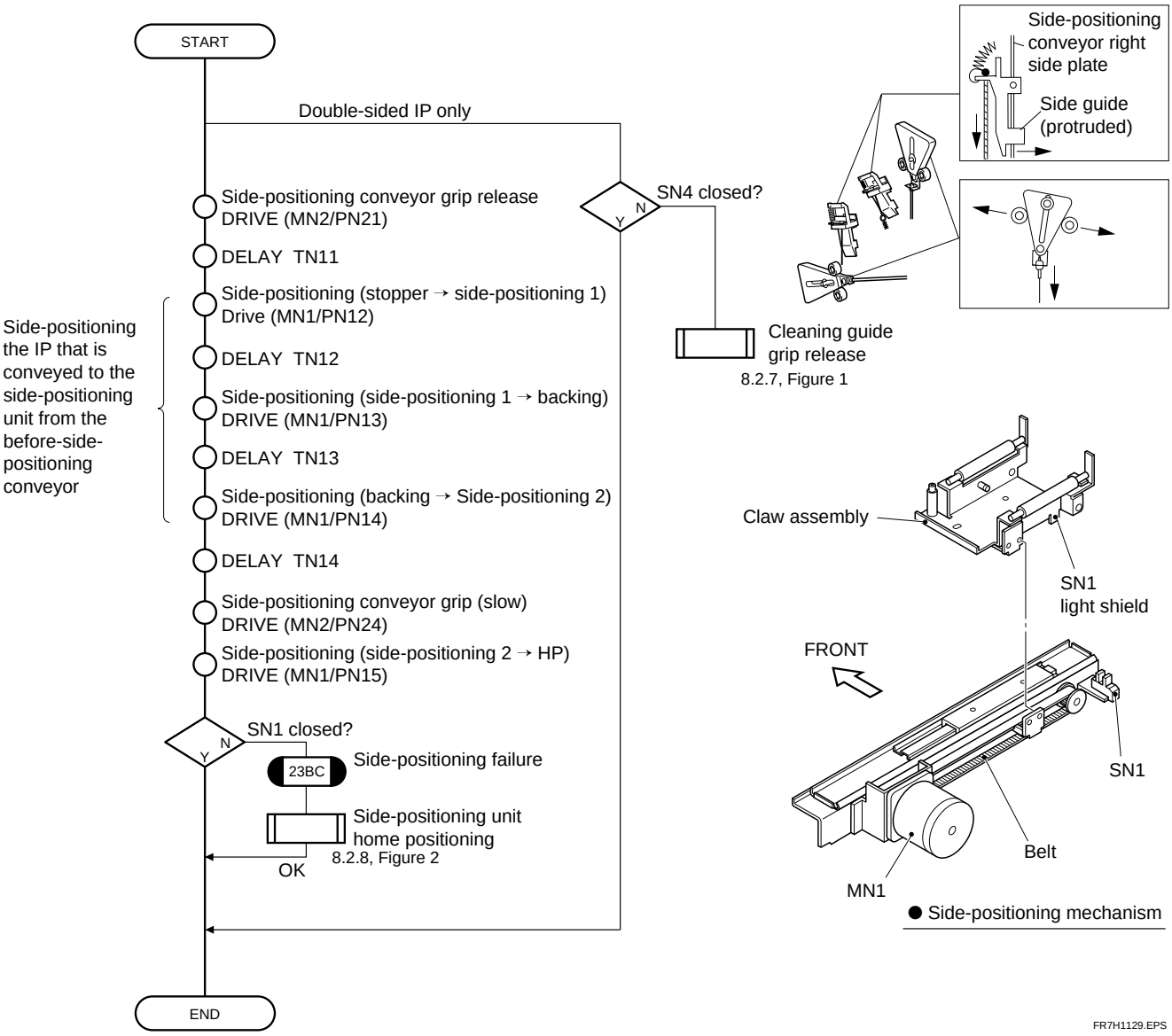


Table 8.2.8.1 Operation Parameters

Symbol	Description	Value
PN21	Conveyor grip release	CW 256 P
PN24	Conveyor grip (slow)	CW 144 P
TN11	Wait for IP halt before side-positioning	0.2 sec
TN12	Wait for side-positioning backing	0.02 sec
TN13	Wait for second side-positioning	0.02 sec
TN14	Wait for side-positioned IP halt	0.02 sec

TR7H1161.EPS

Table 8.2.8.2 Operation Parameters

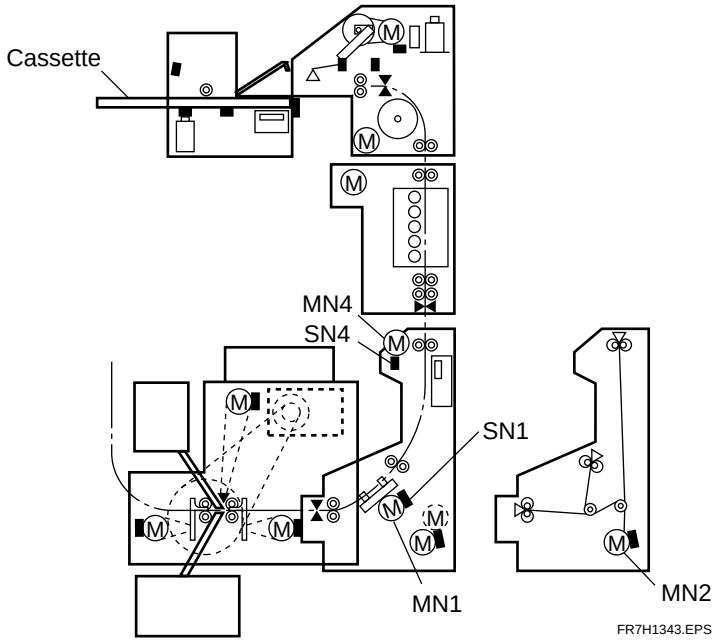
Symbol	Description	14" x 17"	14" x 14"	10" x 12"	8" x 10"	1824ST	2430ST	1824HR	2430HR
PN12	Side-positioning (stopper → side-positioning 1)	65	65	745	745	839	839	827	427
PN13	Side-positioning (side-positioning 1 → backing)	-68	-68	-68	-68	-68	-68	-34	-34
PN14	Side-positioning (backing → side-positioning 2)	68	68	68	68	68	68	34	34
PN15	Side-positioning (side-positioning 2 → backing)	-129	-129	-809	-809	-903	-903	-891	-491

Unit: P

Direction of rotation: CW for positive values or CCW for negative values

TR7H1212.EPS

<I/O arrangement diagram>



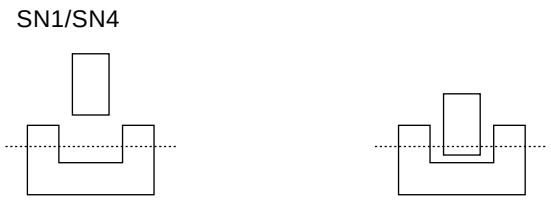
FR7H1343.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
MN4	Cleaning guide driving motor	Pulse motor	Grips/releases the cleaning guide.
SN4	Cleaning guide HP sensor	PI (5mm)	Detects the cleaning guide HP.

TR7H1107.EPS

<Sensor ON/OFF status>



FR7H1313.EPS

<Figure 2 Side-positioning HPing flowchart>

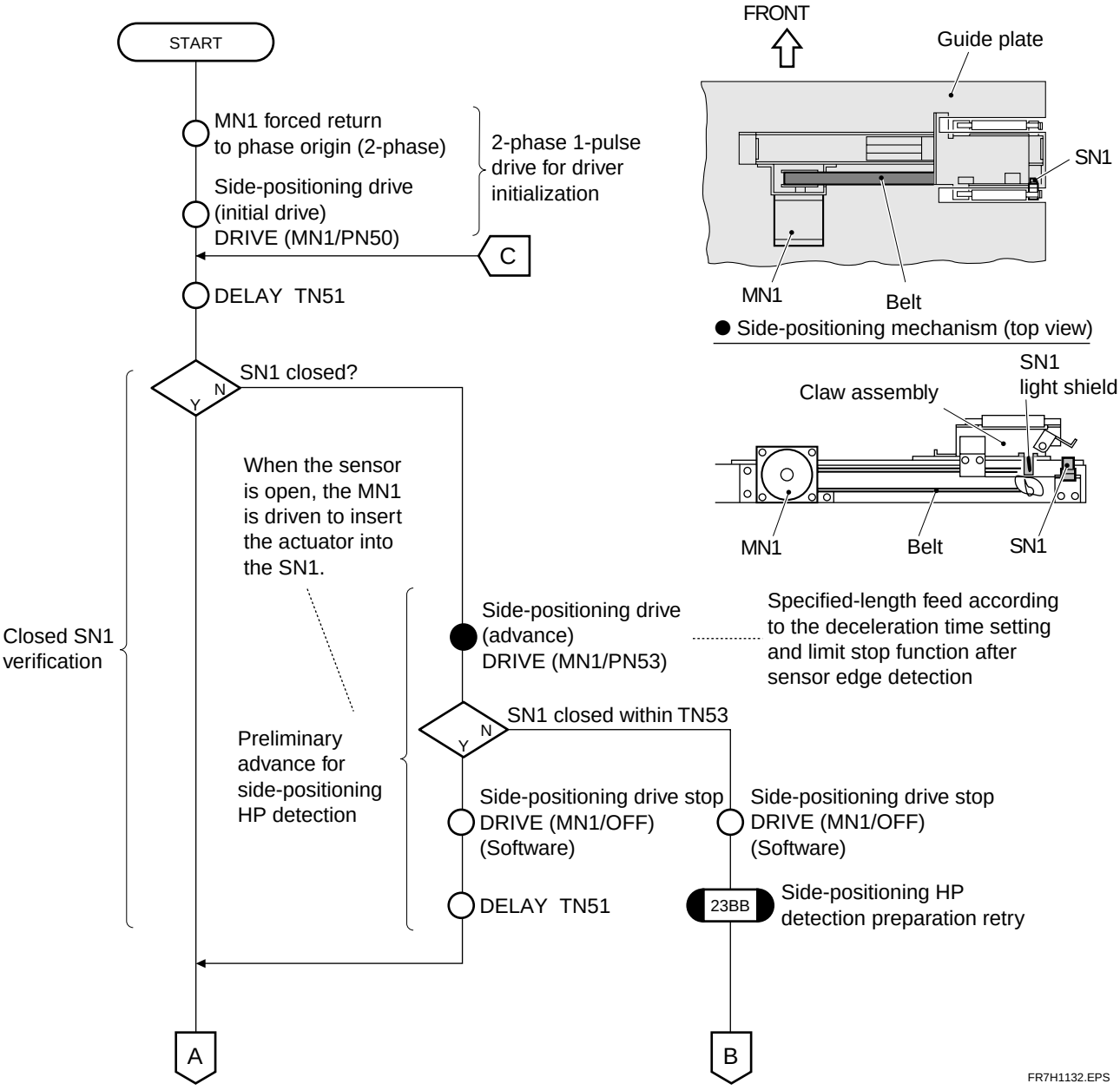
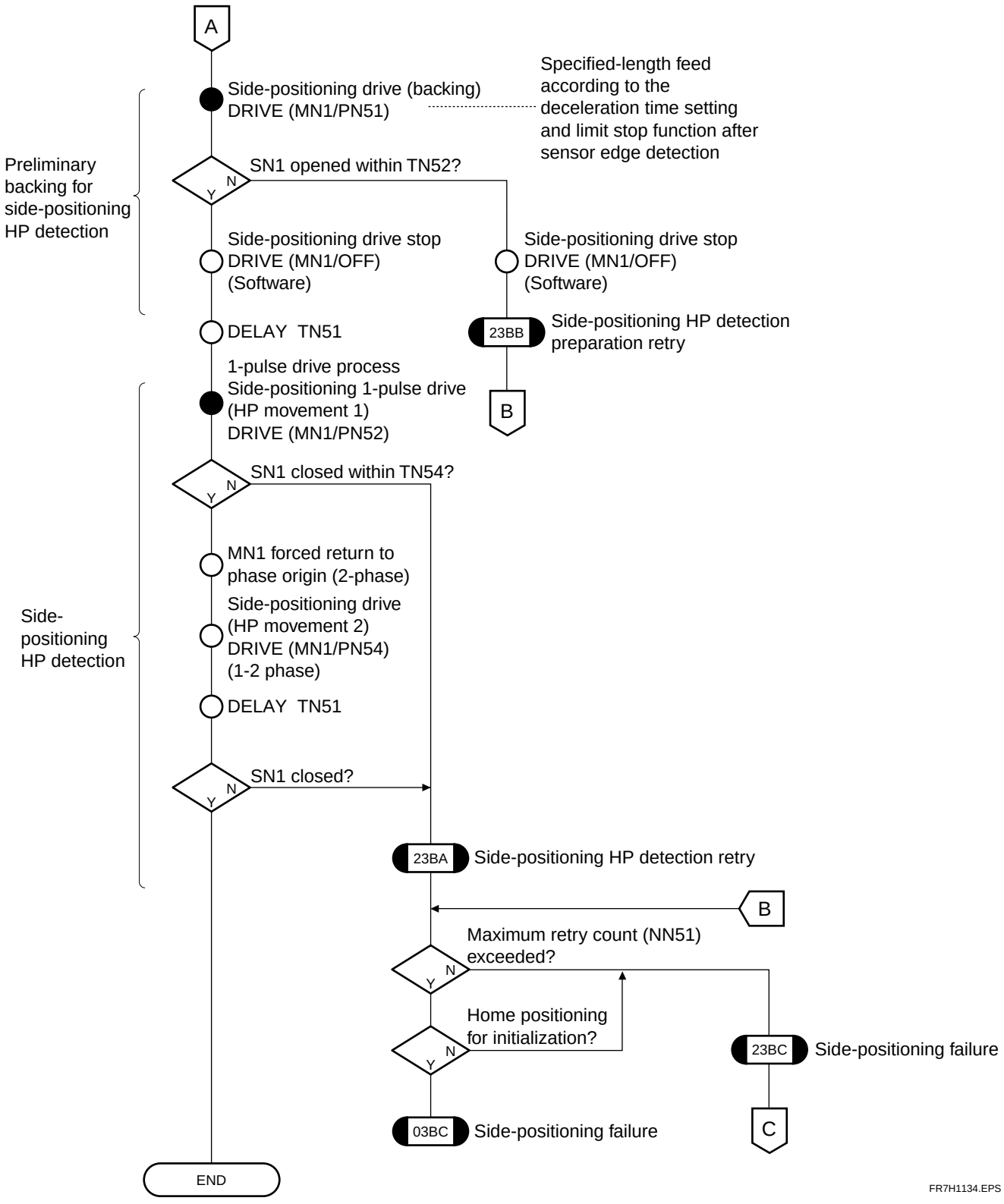


Table 8.2.8.3 Operation Parameters

Symbol	Description	Value
NN51	Side-positioning unit HP retry	3 times
PN50	Side-positioning (initial drive)	CW 1 P
PN51	Side-positioning (backing to HP)	0x7FFFFF
PN52	Side-positioning 1-pulse drive (HP movement 1)	CCW 1 P
PN53	Side-positioning (advance to HP)	0xFFFFFF
PN54	Side-positioning (HP movement 2)	CCW 18 P
TN51	Wait for side-positioning unit halt in HP	0.5 sec
TN52	Side-positioning HP detection preparation timeout	1 sec
TN53	Side-positioning HP detection timeout	8 sec
TN54	Side-positioning unit HP 1-pulse drive timeout	10 sec

0x7FFFFF: Infinitely CW
0xFFFFFF: Infinitely CCW

TR7H1162.EPS


A
Side-positioning drive (backing)
DRIVE (MN1/PN51)
Specified-length feed according to the deceleration time setting and limit stop function after sensor edge detection
Preliminary backing for side-positioning HP detection
SN1 opened within TN52?
N
Y
Side-positioning drive stop
DRIVE (MN1/OFF)
(Software)
Side-positioning drive stop
DRIVE (MN1/OFF)
(Software)
DELAY TN51
23BB
Side-positioning HP detection preparation retry
B
1-pulse drive process
Side-positioning 1-pulse drive
(HP movement 1)
DRIVE (MN1/PN52)
SN1 closed within TN54?
N
Y
MN1 forced return to phase origin (2-phase)
Side-positioning HP detection
Side-positioning drive
(HP movement 2)
DRIVE (MN1/PN54)
(1-2 phase)
DELAY TN51
SN1 closed?
N
Y
23BA
Side-positioning HP detection retry
B
Maximum retry count (NN51) exceeded?
N
Y
Home positioning for initialization?
N
Y
23BC
Side-positioning failure
C
03BC
Side-positioning failure
END
FR7H1134.EPS

8.2.9 CSL/IDT information confirmation

<Figure 1 CSL/IDT information confirmation flowchart>

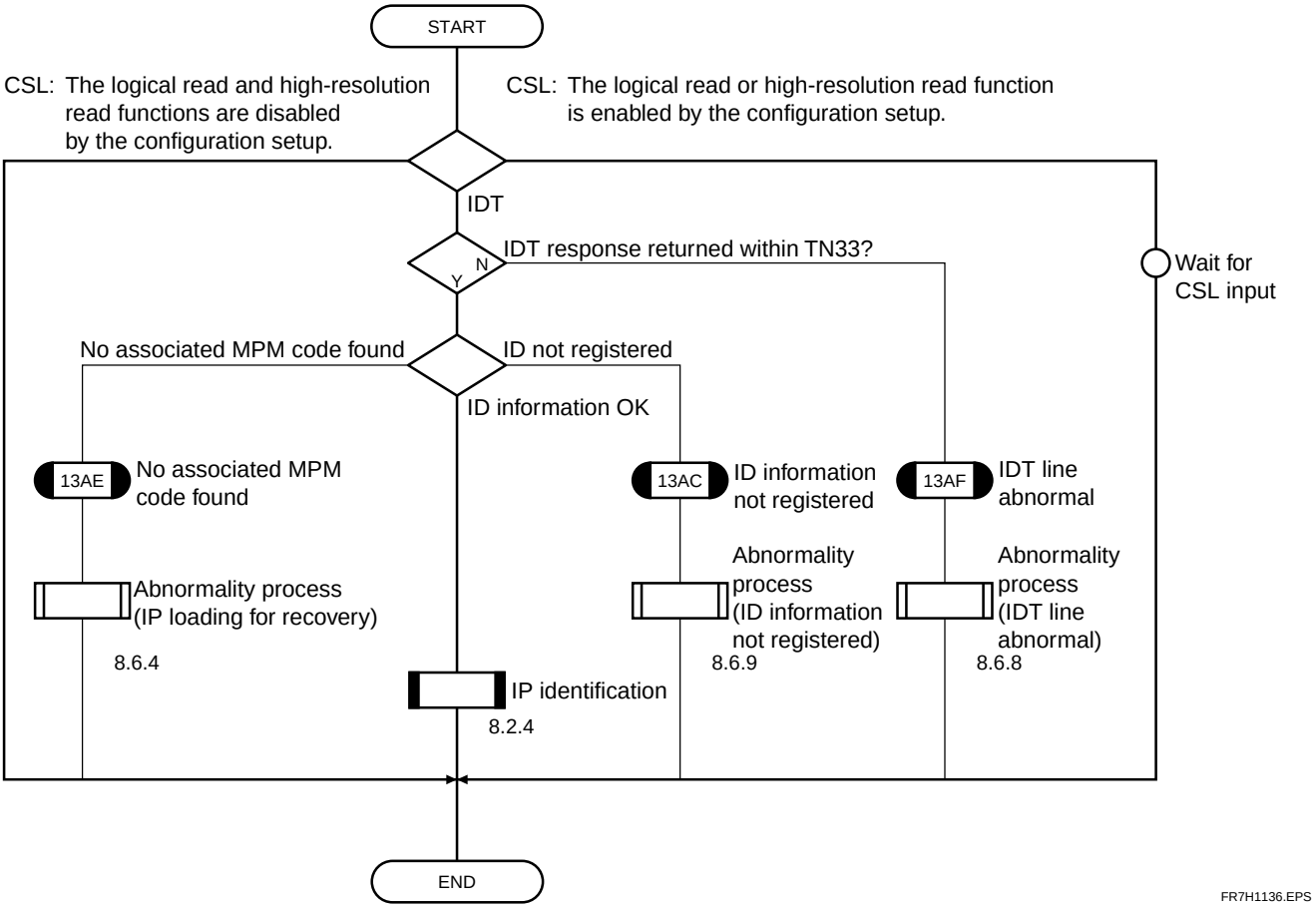


Table 8.2.9.1 Operation Parameter

Symbol	Description	Value
TN33	IDT response timeout	120 sec

TR7H1163.EPS

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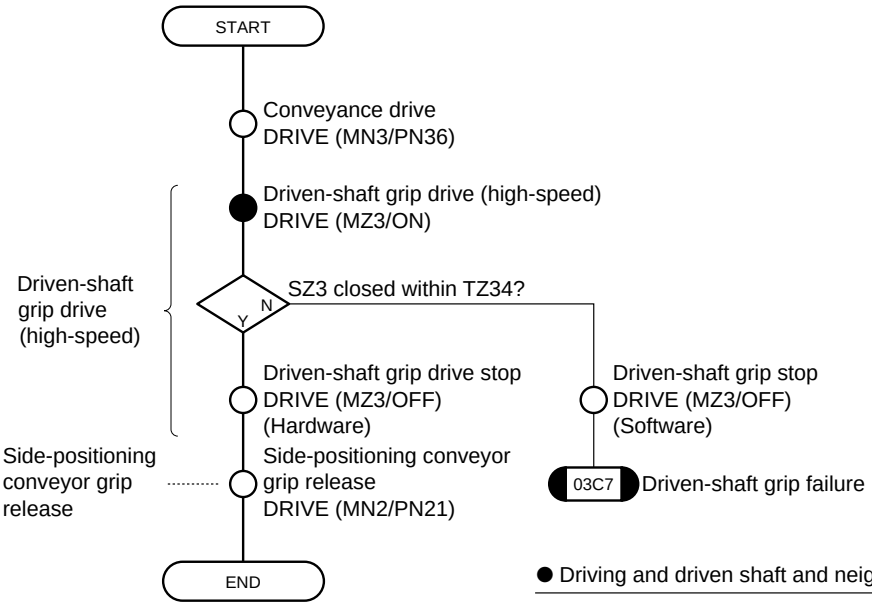
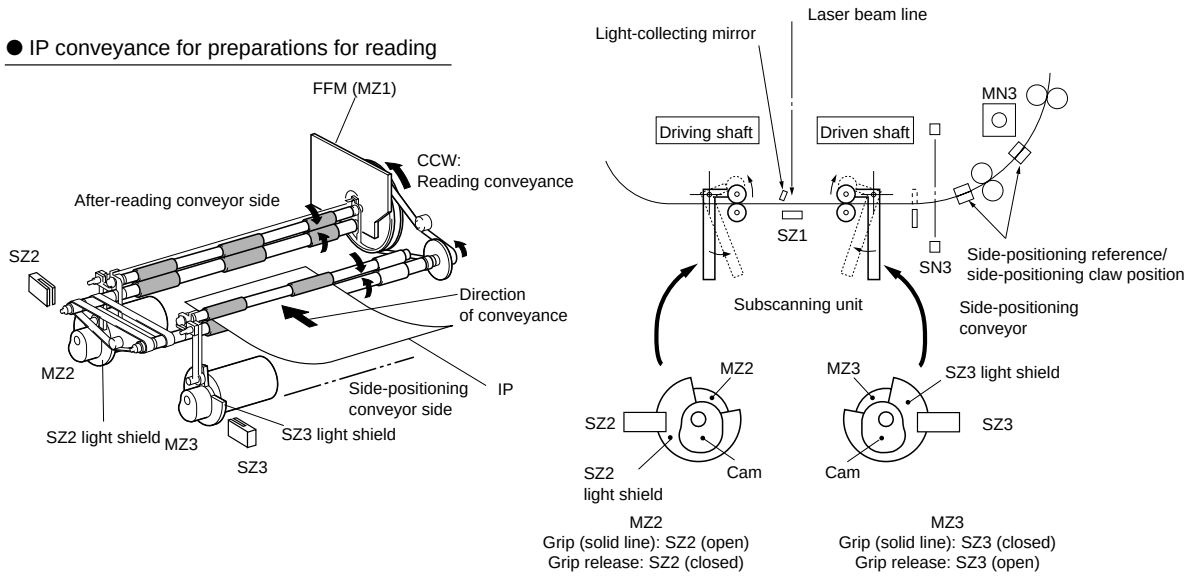
8.2.10 Preparations for reading

<Figure 1 Read preparation flowchart>



● Driving and driven shaft and neighboring mechanical components (initial state)

● IP conveyance for preparations for reading



FR7H1140.EPS

Table 8.2.10.1 Operation Parameters

Symbol	Description	Value
PN21	Conveyor grip release	CW 256 P
PN36	Conveyance (preparations for reading)	CCW 180 P

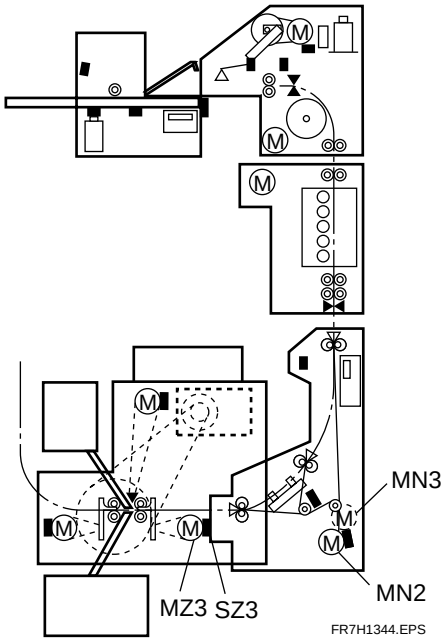
TR7H1164.EPS

Table 8.2.10.2 Operation Parameter

Symbol	Description	Mode	Value
TZ34	Driven-shaft grip timeout	High-speed	1.9
		HR	7.0

Unit: sec TR7H1209.EPS

<I/O arrangement diagram>

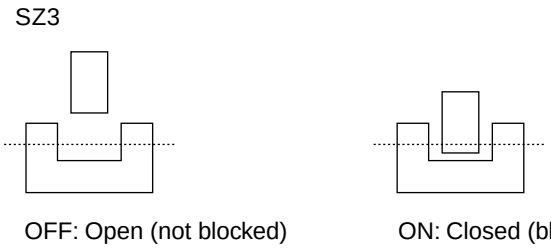


<I/O list>

Symbol	Name	Type	Function/remarks
MN2	Grip release motor	Pulse motor	Grips/releases a roller.
MN3	IP transport motor	Pulse motor	Conveys the IP.
MZ3	Driven-shaft grip motor	DC motor	Grips/releases the driven shaft.
SZ3	Driven-shaft grip release HP sensor	PI (5 mm)	Detects the driven-shaft grip release HP.

TR7H1108.EPS

<Sensor ON/OFF status>



8.2.11 Reading

<Figure 1 Reading flowchart>

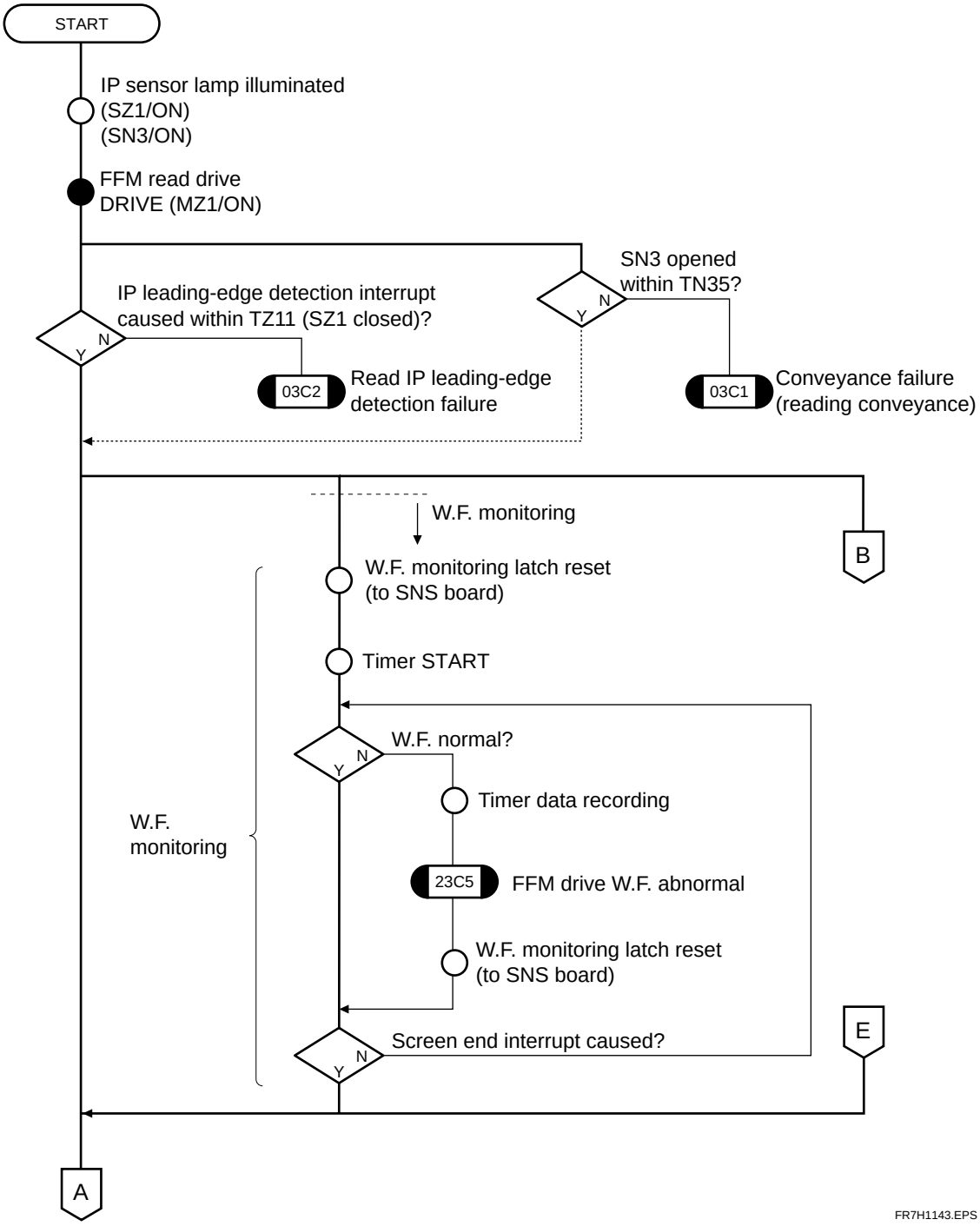


Table 8.2.11.1 Operation Parameters

Symbol	Description	Value
PN22	Conveyor grip	CW 144 P
TZ15	Wait for subscanning unit halt	0.3 sec

TR7H1165.EPS

Table 8.2.11.2 Operation Parameter

Symbol	Description	14" x 17"	14" x 14"	10" x 12"	8" x 10"	1824ST	2430ST	1824HR	2430HR
TN35	Normally read IP trailing edge detection timeout	32.1	25.4	20.9	11.9	9.9	20.5	17.8	28.4

Unit: sec TR7H1213.EPS

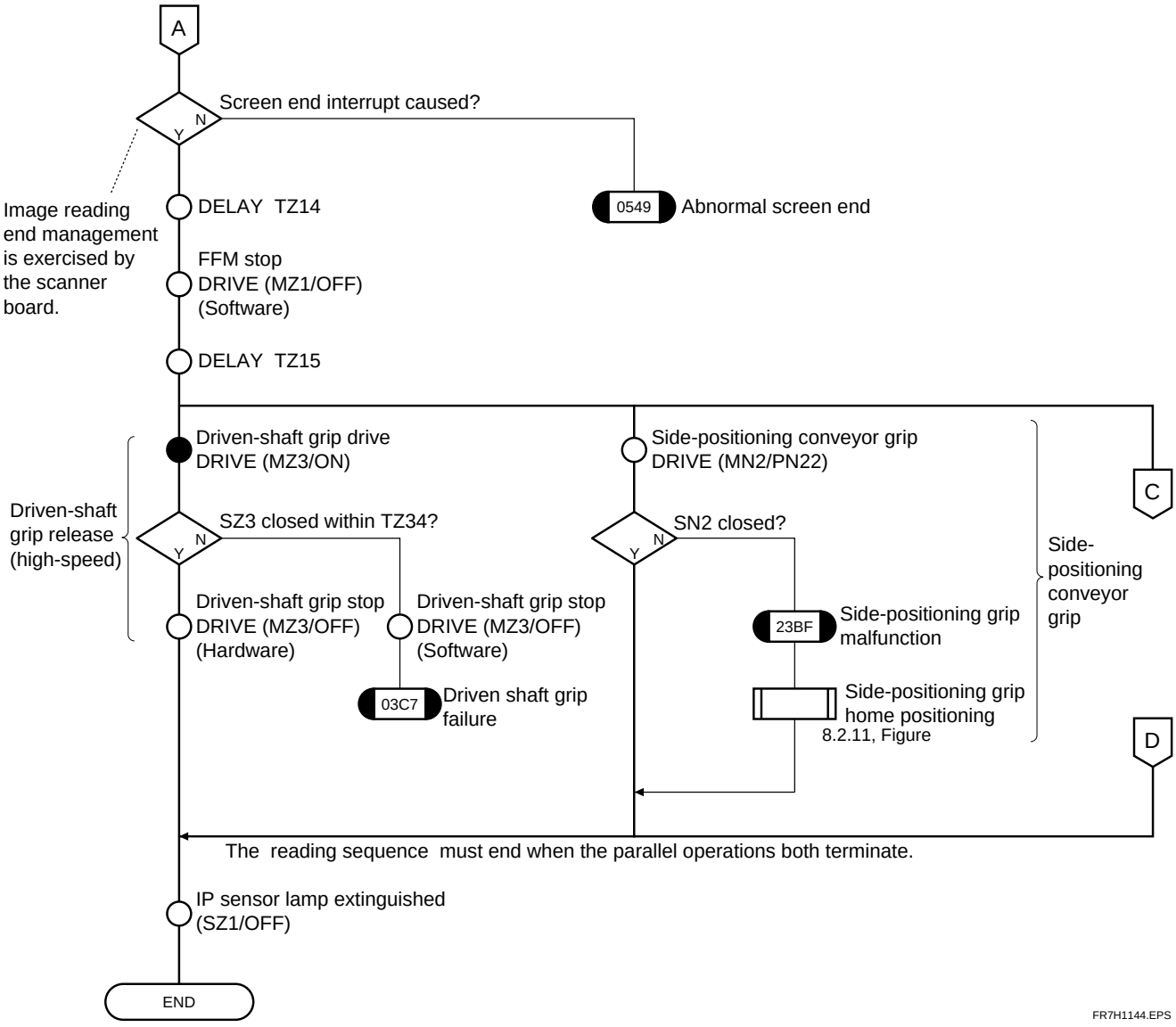


Table 8.2.11.3 Operation Parameter

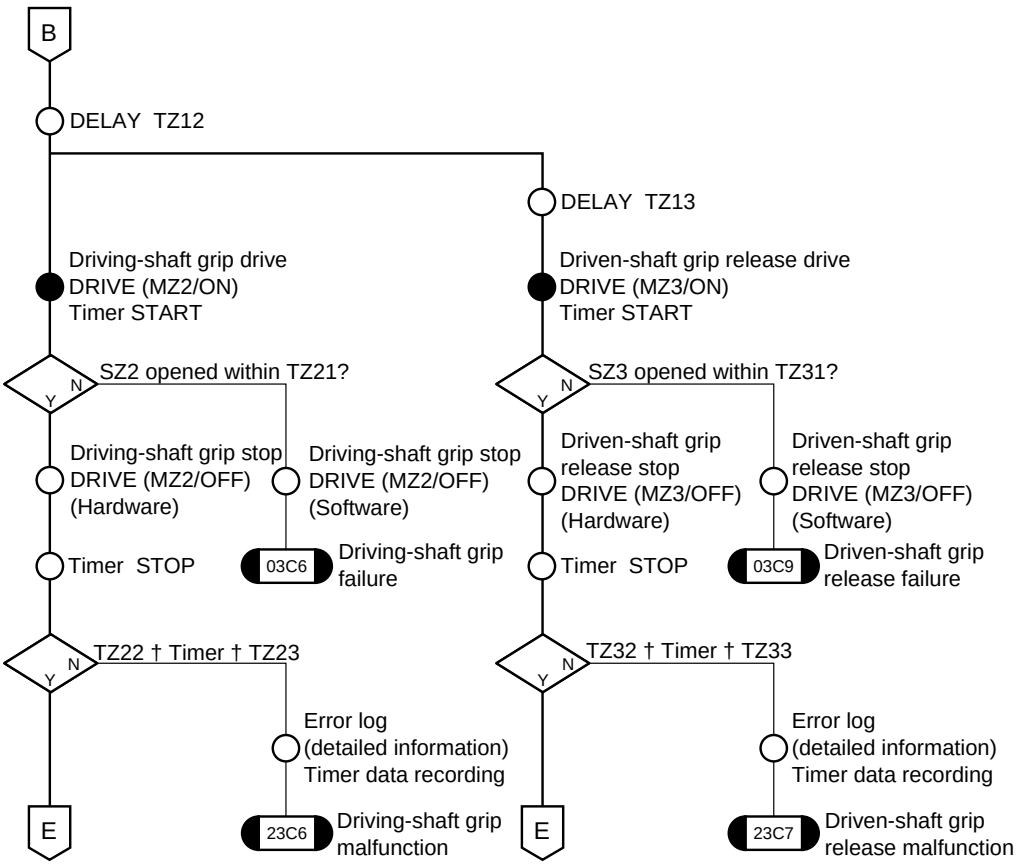
Symbol	Description	Mode	14" x 17"	14" x 14"	10" x 12"
TZ14	Wait for subscanning stop (conveyance correction for logical read)	Standard read	-	-	-
		18 x 43 vertical center	0	0	-
		10 x 8 horizontal upper right corner	0	0	-
		10 x 12 vertical upper right corner	0	-	-
		14 x 14 top	0	-	-
		10 x 8 top	-	-	0
		Pantomograph vertical right-hand center	-	-	0.5

Unit: sec TR7H1214.EPS

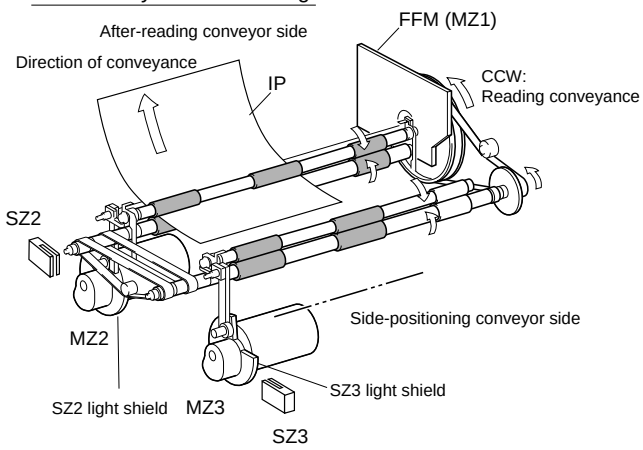
Table 8.2.11.4 Operation Parameter

Symbol	Description	Mode	Value
TZ34	Driven-shaft grip timeout	High-speed	1.9
		HR	7.0

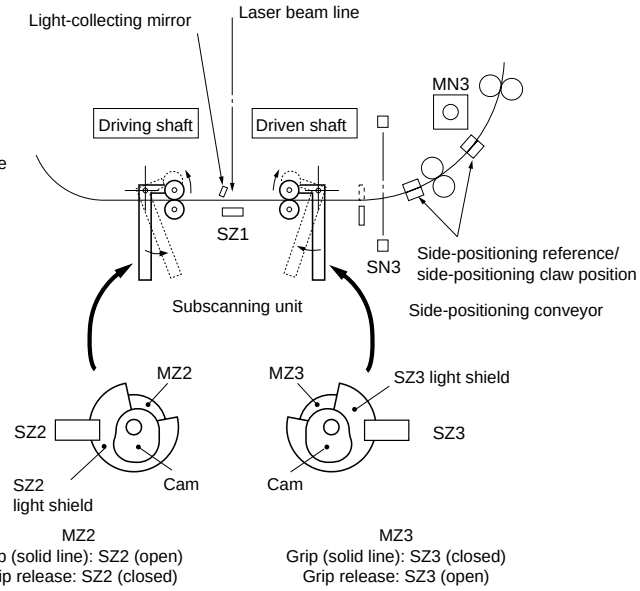
Unit: sec TR7H1215.EPS



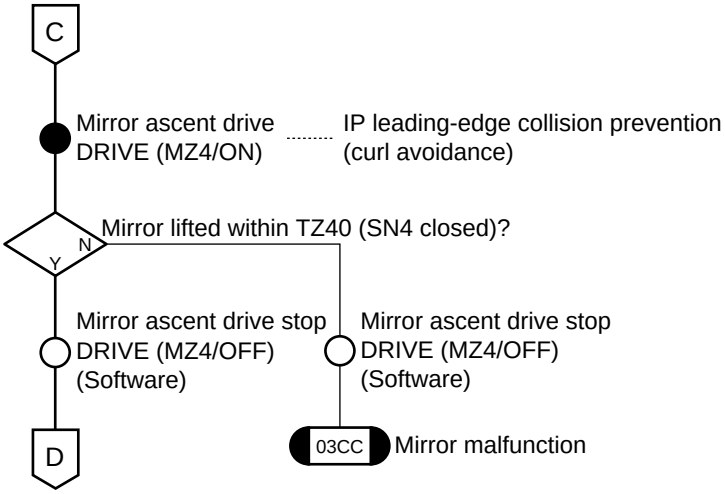
● IP conveyance for reading



● Driving and driven shaft and neighboring mechanical components (initial state)



FR7H1257.EPS



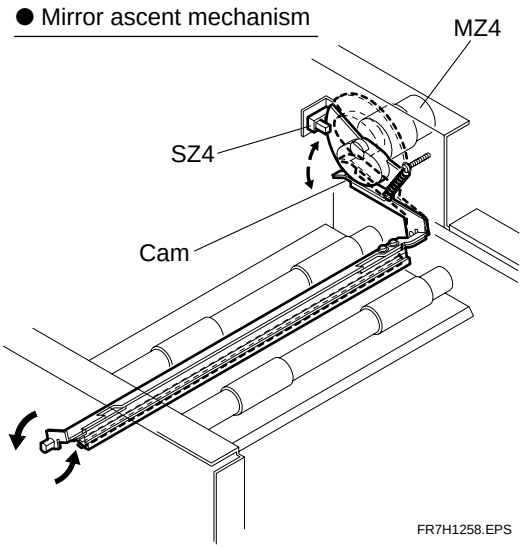


Table 8.2.11.5 Operation Parameters

Symbol	Description	Mode	Value
TZ21	Driving-shaft grip timeout	ST	7.6
		HR	15.3
TZ22	Driving-shaft grip specified upper limit	ST	2.7
		HR	5.3
TZ23	Driving-shaft grip specified upper limit	ST	5.0
		HR	9.9
TZ31	Driven-shaft grip release timeout	ST	6.2
		HR	12.4
TZ32	Driven-shaft grip release specified lower limit	ST	2.2
		HR	4.2
TZ33	Driven-shaft grip release specified upper limit	ST	4.0
		HR	8.1

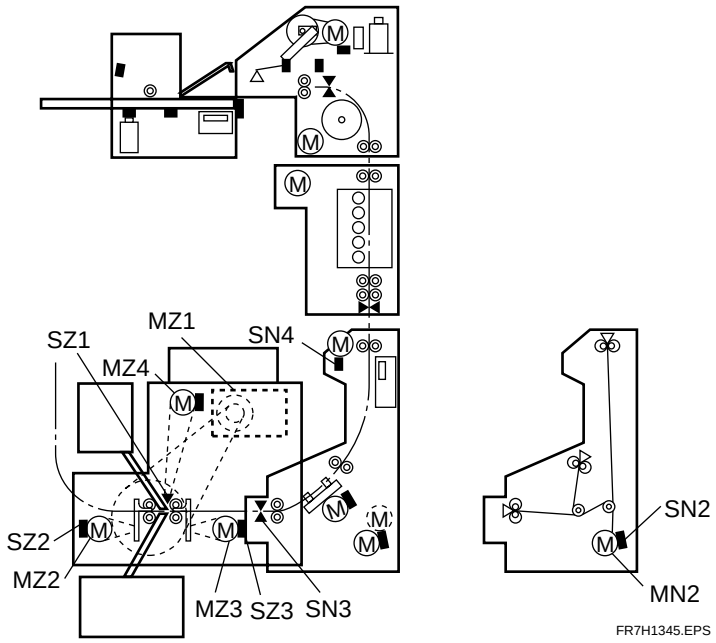
Unit: sec TR7H1166.EPS

Table 8.2.11.6 Operation Parameter

Symbol	Description	Value
TZ40	Mirror ascent timeout	1 sec

TR7H1241.EPS

<I/O arrangement diagram>



FR7H1345.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
MN2	Grip release motor	Pulse motor	Grips/releases a roller.
MZ1	Subscanning moto	FFM9	Conveys the IP.
MZ2	Driving-shaft grip motor	DC motor	Grips/releases the driving shaft.
MZ3	Driven-shaft grip motor	DC motor	Grips/releases the driven shaft.
MZ4	Mirror driving motor	DC motor	Moves the mirror up and down.
SN2	Grip release HP sensor	PI (5 mm)	Detects the roller grip release HP.
SN3	Side-positioning IP sensor	PI (19 mm)	IP transport sensor
SN4	Cleaning guide HP sensor	PI (5 mm)	Detects the cleaning guide HP.
SZ1	IP leading-edge sensor	Laser	IP transport sensor (SED08D)
SZ2	Driving-side grip release HP sensor	PI (5 mm)	Detects the driving-side grip release HP.
SZ3	Driven-side grip release HP sensor	PI (5 mm)	Detects the driven-side grip release HP.

TR7H1109.EPS

<Sensor ON/OFF status>

SN2/SN4/SZ2/SZ3

OFF: Open (not blocked)　　ON: Closed (blocked)

SN3/SZ1

OFF: Open (IP not found)　　ON: Closed (IP found)

FR7H1315.EPS

<Figure 2 Side-positioning grip HPing flowchart>

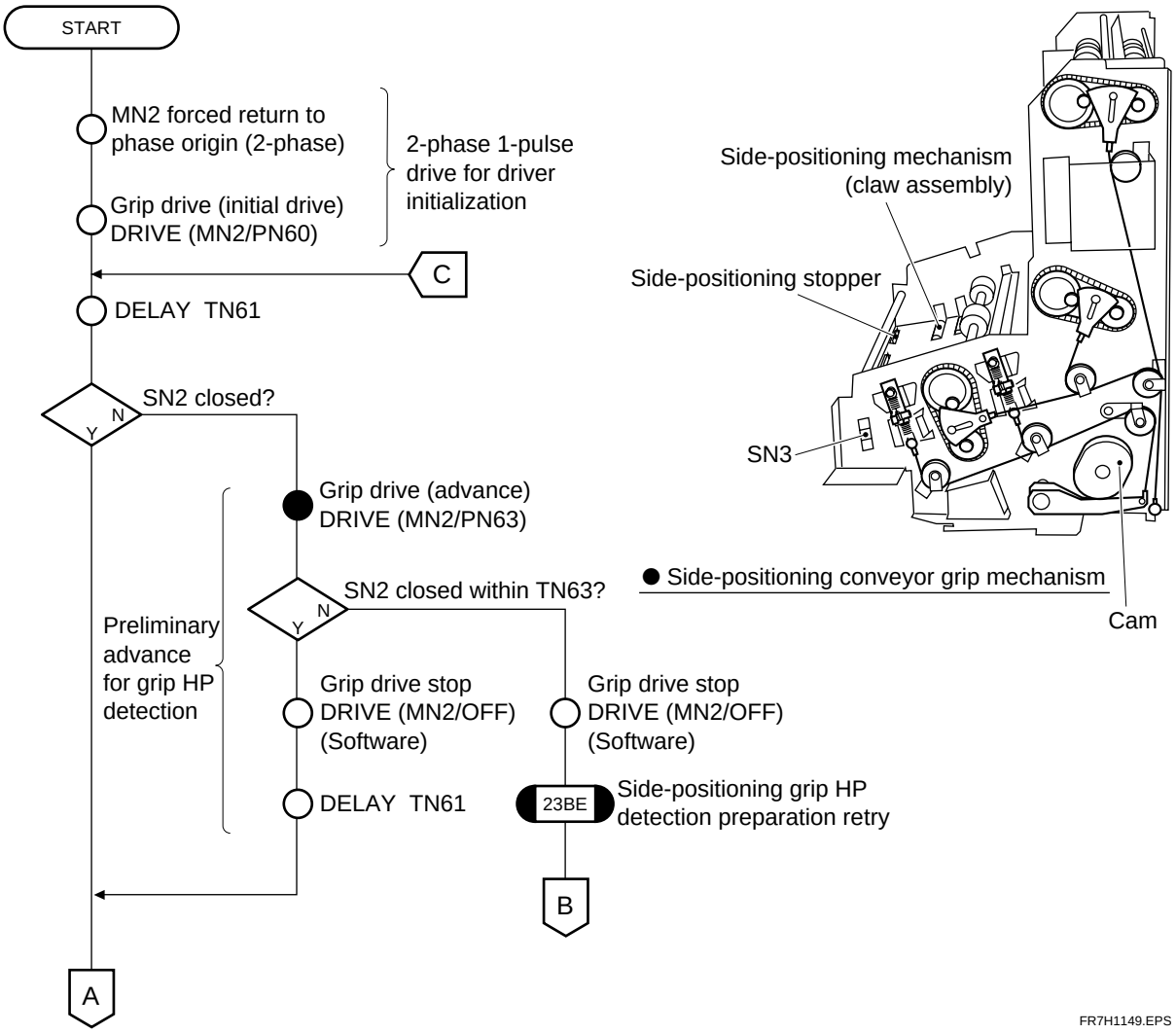


Table 8.2.11.7 Operation Parameters

Symbol	Description	Value
PN60	Conveyor grip (initial drive)	CW 1 P
PN63	Conveyor grip (advance to HP)	0x7FFFFF
TN61	Wait for conveyor grip halt in HP	0.5 sec
TN63	Conveyor grip HP detection timeout	13.3 sec

0x7FFFFF: Infinitely CW

TR7H1167.EPS

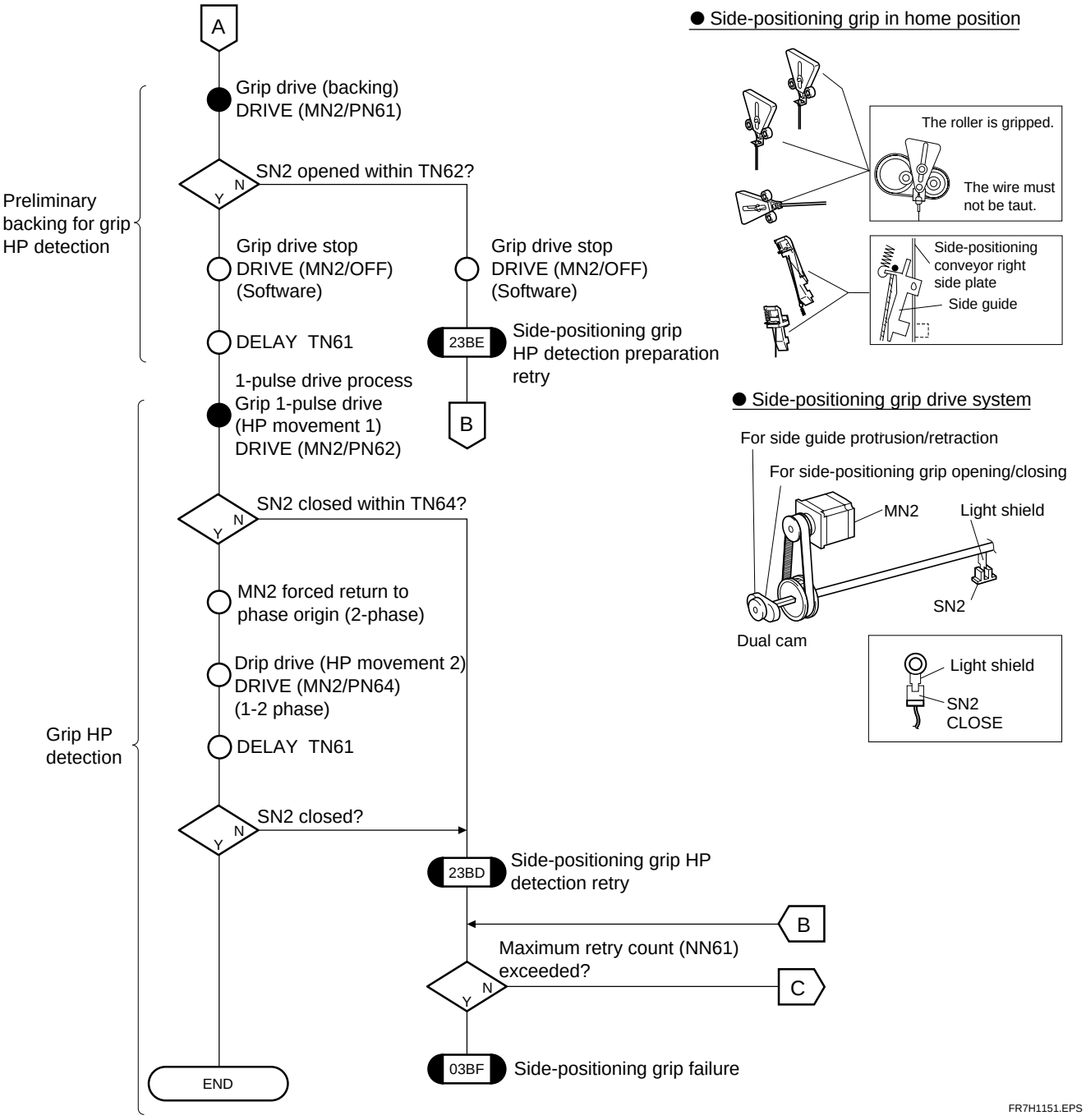


Table 8.2.11.8 Operation Parameters

Symbol	Description	Value
NN61	Conveyor grip HP retry	3 times
PN61	Conveyor grip (backing to HP)	0xFFFFFF
PN62	Conveyor grip 1-pulse drive (HP movement 1)	CW 1 P
PN64	Conveyor grip (HP movement 2)	CW 6 P
TN61	Wait for conveyor grip halt in HP	0.5 sec
TN62	Conveyor grip HP detection preparation timeout	1.2 sec
TN64	Conveyor grip 1-pulse drive timeout	10 sec

0xFFFFFF: Infinitely CCW

TR7H1168.EPS

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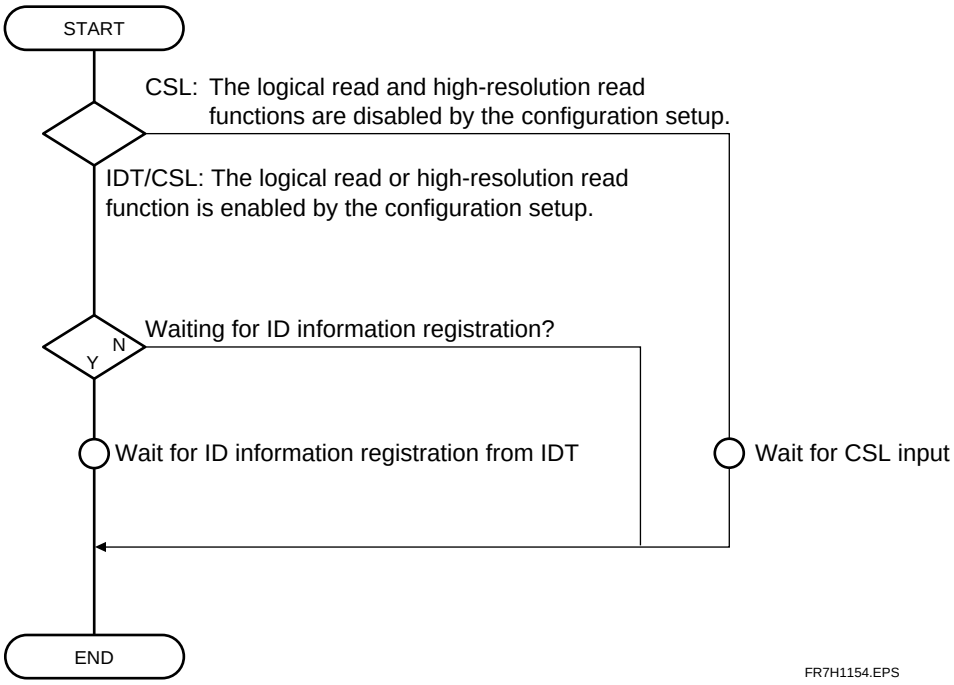
8.2.12 CSL/IDT information confirmation 2

<Figure 1 CSL/IDT information confirmation 2 flowchart>


START
CSL: The logical read and high-resolution read functions are disabled by the configuration setup.
IDT/CSL: The logical read or high-resolution read function is enabled by the configuration setup.
Waiting for ID information registration?
N
Y
Wait for ID information registration from IDT
Wait for CSL input
END
FR7H1154.EPS

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8.2.13 After-reading conveyance

<Figure 1 After-reading conveyance flowchart>

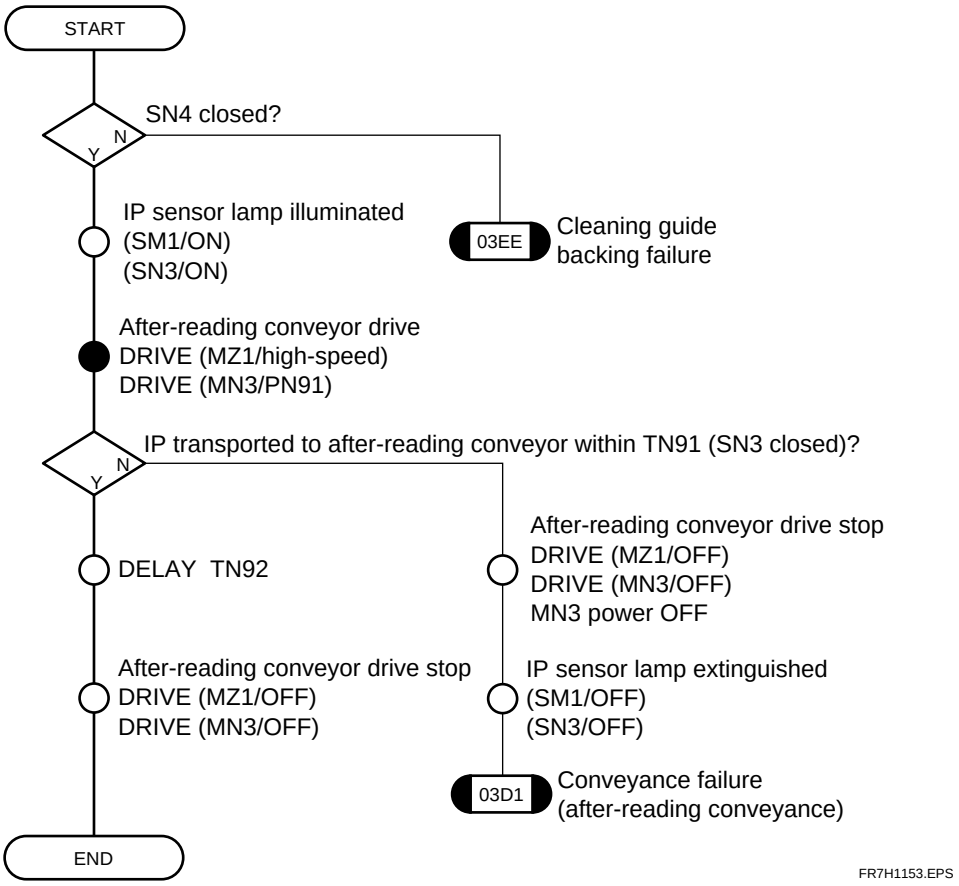


Table 8.2.13.1 Operation Parameters

Symbol	Description	Value
PN91	After-reading conveyance	0x7FFFFF
TN91	SPR after-reading conveyance timeout	2.7 sec

0x7FFFFF: Infinitely CW

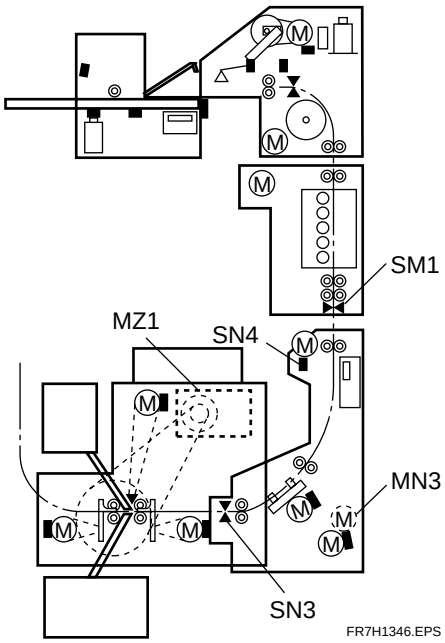
TR7H1169.EPS

Table 8.2.13.2 Operation Parameter

Symbol	Description	14" x 17"	14" x 14"	10" x 12"	8" x 10"	1824ST	2430ST	1824HR	2430HR
TN92	Wait for SPR after-reading trailing edge detection	2.57	2.07	1.74	1.06	0.91	1.7	0.91	1.31

Unit: sec TR7H1219.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
MN3	IP transport motor	Pulse motor	Conveys the IP.
MZ1	Subscanning motor	FFM9	Conveys the IP.
SM1	Before-BCR IP sensor	PI (19 mm)	IP transport sensor
SN3	Side-positioning IP sensor	PI (19 mm)	IP transport sensor
SN4	Cleaning guide HP sensor	PI (5 mm)	Detects the cleaning guide HP

TR7H1110.EPS

<Sensor ON/OFF status>

SN4

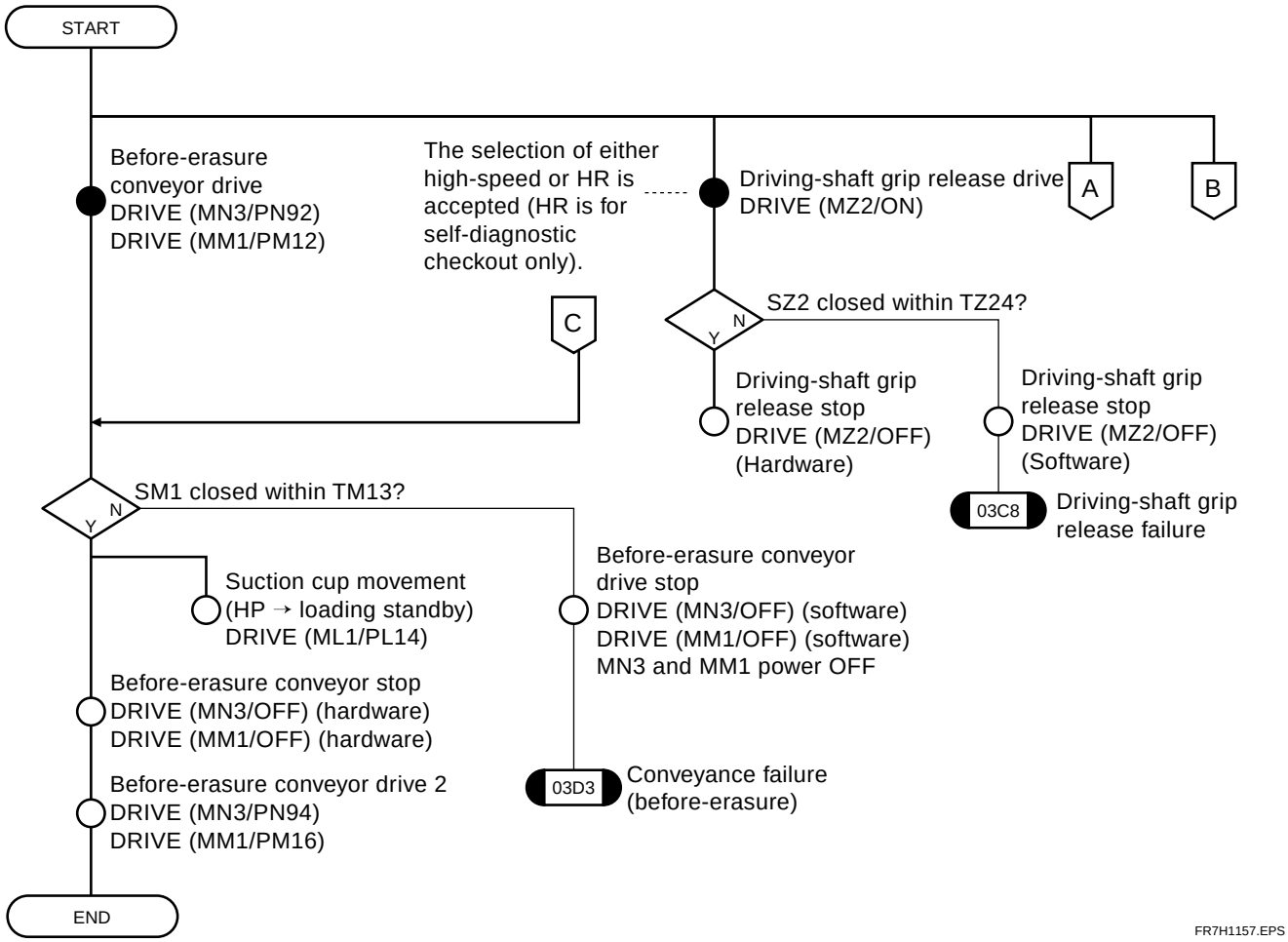
OFF: Open (not blocked)　　ON: Closed (blocked)

SM1/SN3

OFF: Open (IP not found)　　ON: Closed (IP found)　FR7H1316.EPS

8.2.14 Before-erasure conveyance

<Figure 1 Before-erasure conveyance flowchart>



FR7H1157.EPS

Table 8.2.14.1 Operation Parameters

Symbol	Description	Value
PM16	Before-erasure conveyance 2	CW 435 P
PN94	Before-erasure conveyance 2	CW 348 P
TZ41	Mirror ascent timeout	1 sec

TR7H1170.EPS

Table 8.2.14.2 Operation Parameters

Symbol	Description	Value
PM12	Conveyance (before-erasure conveyance)	0x7FFFFF
PN92	Before-erasure conveyance	0x7FFFFF

Unit: P
0x7FFFFF: Infinitely CW

Table 8.2.14.3 Operation Parameter

Symbol	Description	14" x 17"	14" x 14"	10" x 12"	8" x 10"	1824ST	2430ST	1824HR	2430HR
TM13	SPR before-erasure conveyor timeout	0	0	0	0	0	0	0	0

Unit: sec TR7H1216.EPS

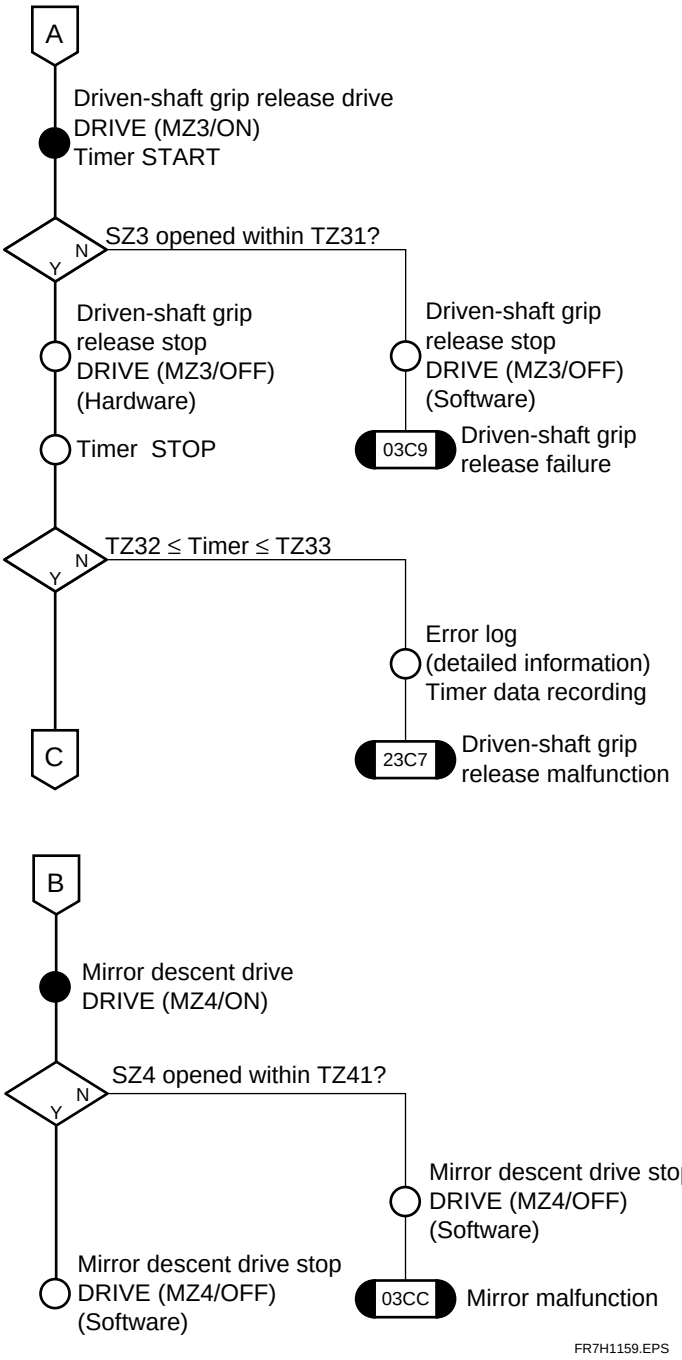
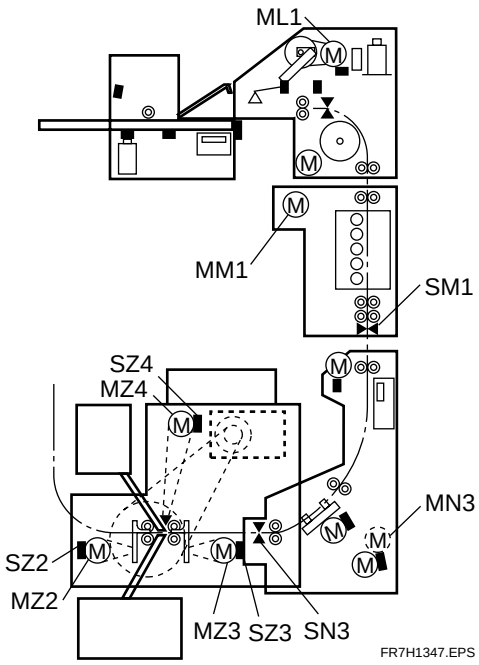


Table 8.2.14.4 Operation Parameters

Symbol	Description	Mode	Value
TZ24	Driving-shaft grip release timeout	ST	3.0
		HR	8.5
TZ31	Driven-shaft grip release timeout	ST	6.2
		HR	12.4
TZ32	Driven-shaft grip release specified lower limit	ST	2.2
		HR	4.3
TZ33	Driven-shaft grip release specified upper limit	ST	4.0
		HR	8.1

Unit: sec TR7H1217.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
ML1	Suction cup driving motor	Pulse motor	Opens the cassette rear cover and moves a roller.
MM1	IP transport motor	Pulse motor	Conveys the IP.
MN3	IP transport motor	Pulse motor	Conveys the IP.
MZ2	Driving shaft grip motor	DC motor	Grips/releases the driving shaft.
MZ3	Driven shaft grip motor	DC motor	Grips/releases the driven shaft.
MZ4	Mirror driving motor	DC motor	Moves the mirror up and down.
SM1	Before-BCR IP sensor	PI (19 mm)	IP transport sensor
SN3	Side-positioning IP sensor	PI (19 mm)	IP transport sensor
SZ2	Driving-side grip release HP sensor	PI (5 mm)	Detects the driving-side grip release HP.
SZ3	Driven-side grip release HP sensor	PI (5 mm)	Detects the driven-side grip release HP.
SZ4	Mirror HP sensor	PI (5 mm)	Detects the mirror HP.

TR7H1111.EPS

<Sensor ON/OFF status>

SZ2/SZ3/SZ4

OFF: Open (not blocked)　　ON: Closed (blocked)

SM1/SN3

OFF: Open (IP not found)　　ON: Closed (IP found)　FR7H1317.EPS

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8.2.15 Erasure conveyance

<Figure 1 Erasure conveyance flowchart>

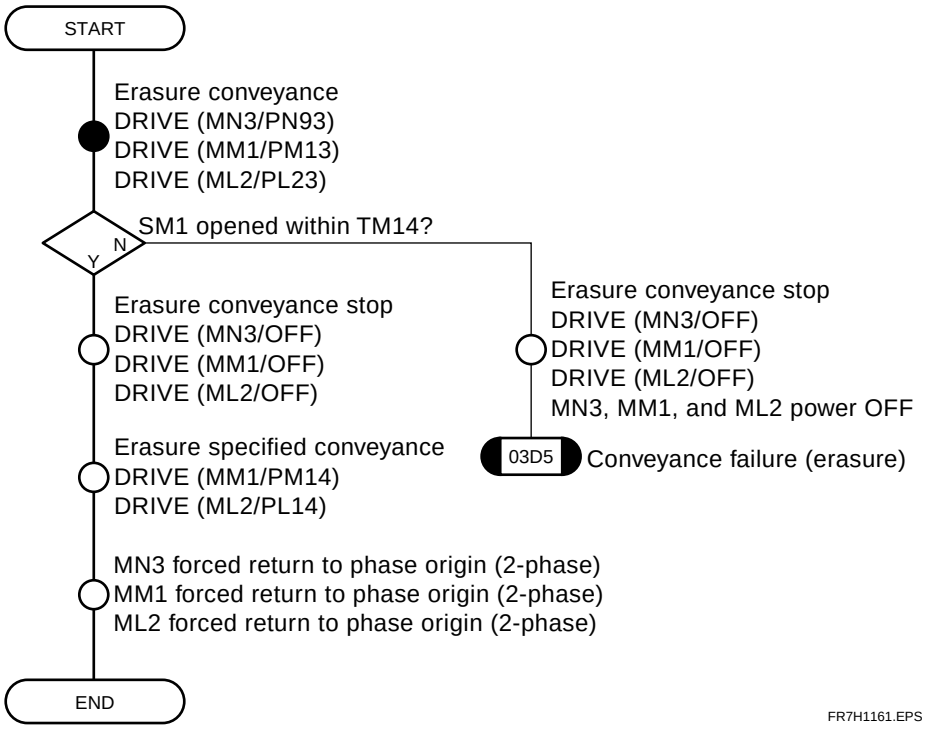


Table 8.2.15.1 Operation Parameters (TM14: SPR erasure conveyance IP trailing edge detection timeout)

IP type/sensitivity / X-ray dose (mR)	V-type ST standard sensitivity	V-type ST medium-high sensitivity	V-type ST high sensitivity
0–25	10.9	10.9	10.9
25–40	12.8	12.8	12.8
40–63	15.6	15.6	15.6
63–85	18.1	18.1	–
85–120	21.9	21.9	–
120–200	28.2	28.2	–
200–250	31.3	–	–
250–300	33.6	–	–
300–350	35.8	–	–
350–400	38.1	–	–
400–	55.1	–	–

IP type/sensitivity / X-ray dose (mR)	HR-BD standard sensitivity
0–200	10.0
200–300	15.0
300–400	20.0
400–600	25.0
600–800	30.0
800–1000	35.0
1000–1300	40.0
1300–1600	45.0
1600–2000	50.0
2000–2500	60.0
2500–3200	65.0
3200–4000	75.0
4000–	90.0

IP type/sensitivity / X-ray dose (mR)	Other than V-type (different generation)	V-type ST/HR-BD secondary erasure
Limitless	55.1	1.5

Unit: sec TR7H1242.EPS

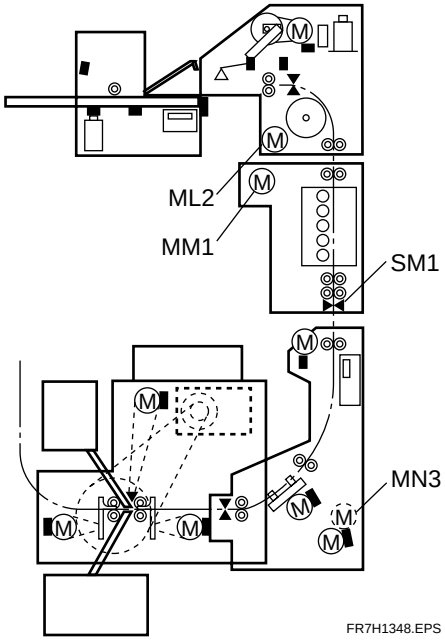
Table 8.2.15.2 Operation Parameters

Symbol	Description	Value
PL14	Suction cup movement (HP → loading standby)	CCW 135 P
PL23	SPR conveyance (erasure 1)	0x7FFFFF
PM13	SPR conveyance (erasure 1)	0x7FFFFF
PM14	SPR conveyance (erasure 2)	CW 11333 P
PN93	Conveyance (erasure 1)	0x7FFFFF

0x7FFFFF: Infinitely CW

TR7H1171.EPS

<I/O arrangement diagram>



FR7H1348.EPS

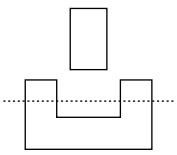
<I/O list>

Symbol	Name	Type	Function/remarks
ML2	IP transport motor	Pulse motor	Conveys the IP.
MM1	IP transport motor	Pulse motor	Conveys the IP.
MN3	IP transport motor	Pulse motor	Conveys the IP.
SM1	Before-BCR IP sensor	PI (19 mm)	IP transport sensor

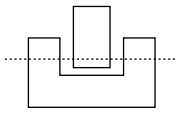
TR7H1112.EPS

<Sensor ON/OFF status>

SN4

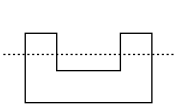


OFF: Open (not blocked)

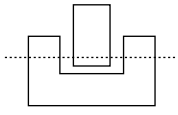


ON: Closed (blocked)

SM1/SN3



OFF: Open (IP not found)

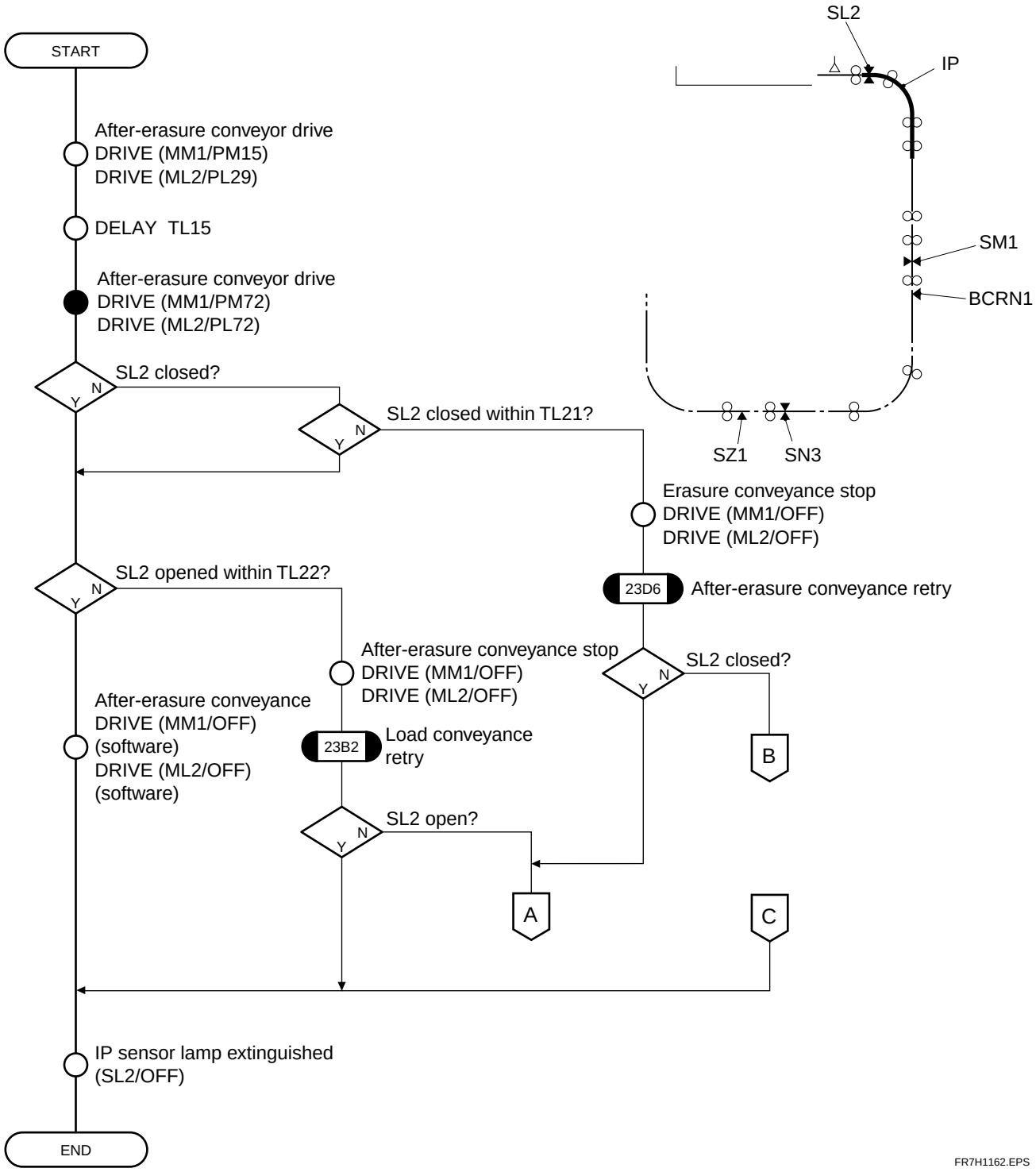


ON: Closed (IP found)

FR7H1316.EPS

8.2.16 After-erasure conveyance

<Figure 1 After-erasure conveyance flowchart>



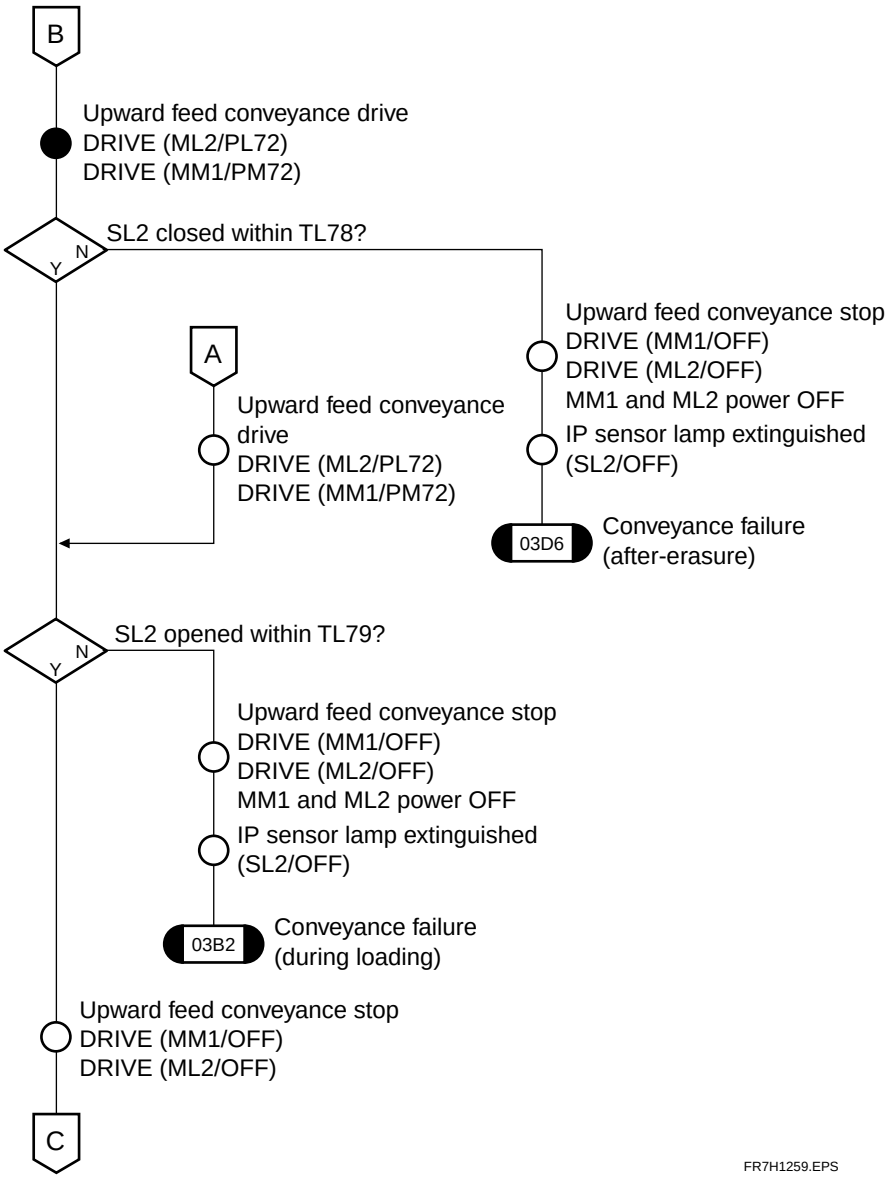


Table 8.2.16.1 Operation Parameters

Symbol	Description	Value
PL29	Conveyance (after-erasure conveyance, high-speed)	CW 1200 P
PM15	Conveyance (after-erasure conveyance)	CW 1200 P
PM72	Initialization conveyance (upward)	0x7FFFFF
TL15	Wait for loading suction	0.1 sec
TL21	After-conveyance timeout	6.4 sec
TL22	Loading timeout	6 sec
TL78	Feed/load conveyance remaining IP transfer timeout	8.7 sec

0x7FFFFF: Infinitely CW

TR7H1172.EPS

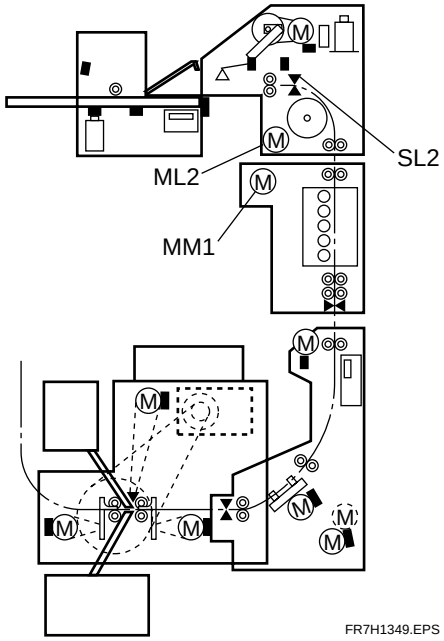
Table 8.2.16.2 Operation Parameter

Symbol	Description	Mode	Value
PL72	Initialization conveyance (upward)	ST	0x7FFFFF
		HR (nonstandard IPs included)	0x7FFFFF

0x7FFFFF: Infinitely CW
Unit: P

TR7H1220.EPS

<I/O arrangement diagram>



FR7H1349.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
ML2	IP transport motor	Pulse motor	Conveys the IP.
MM1	IP transport motor	Pulse motor	Conveys the IP.
SL2	Cassette opening IP sensor	PI (19 mm)	IP transport sensor

TR7H1113.EPS

<Sensor ON/OFF status>

SL2

OFF: Open (IP not found)

ON: Closed (IP found)

FR7H1319.EPS

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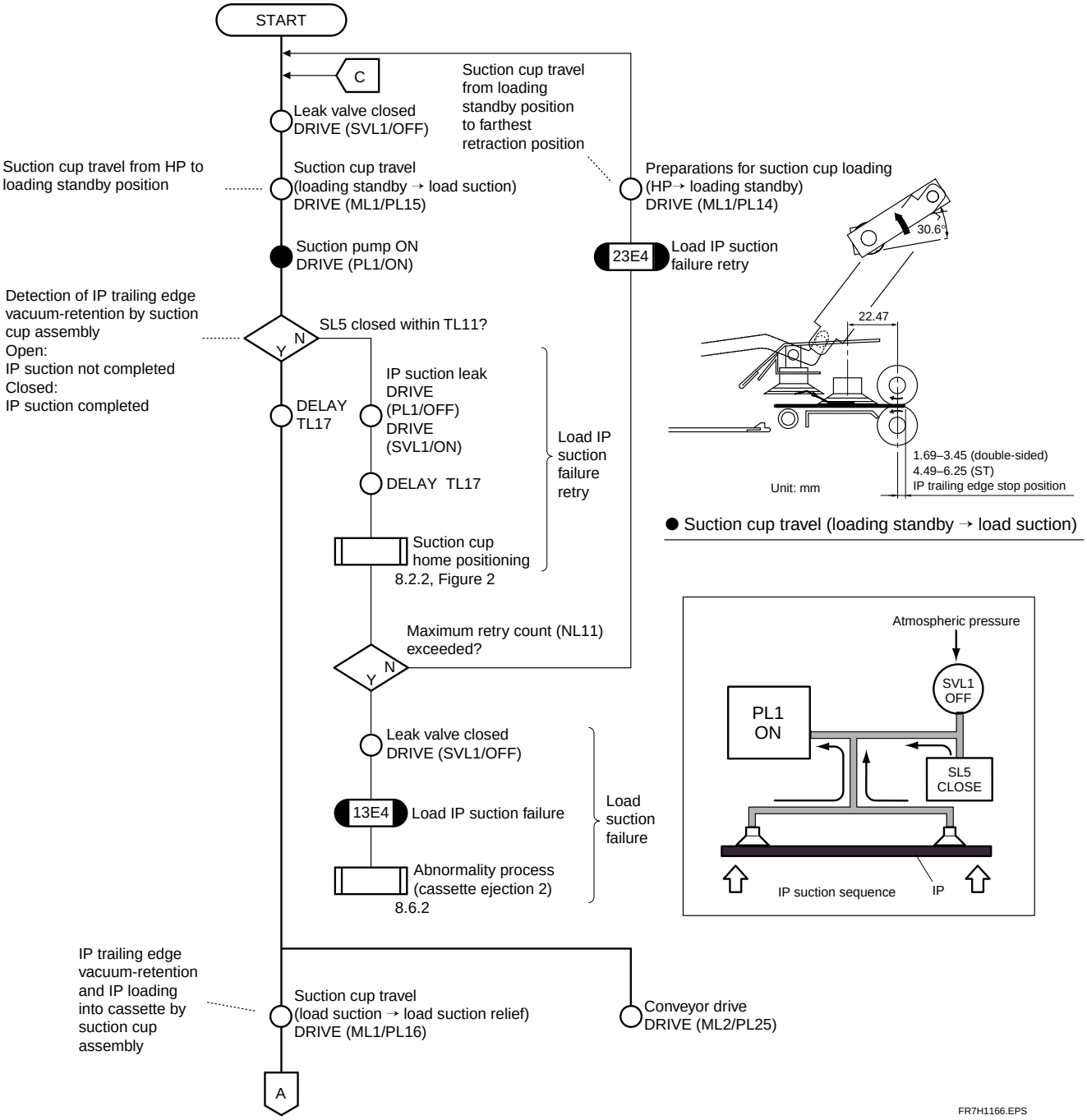
8.2.17 IP loading

<Figure 1 IP loading flowchart>



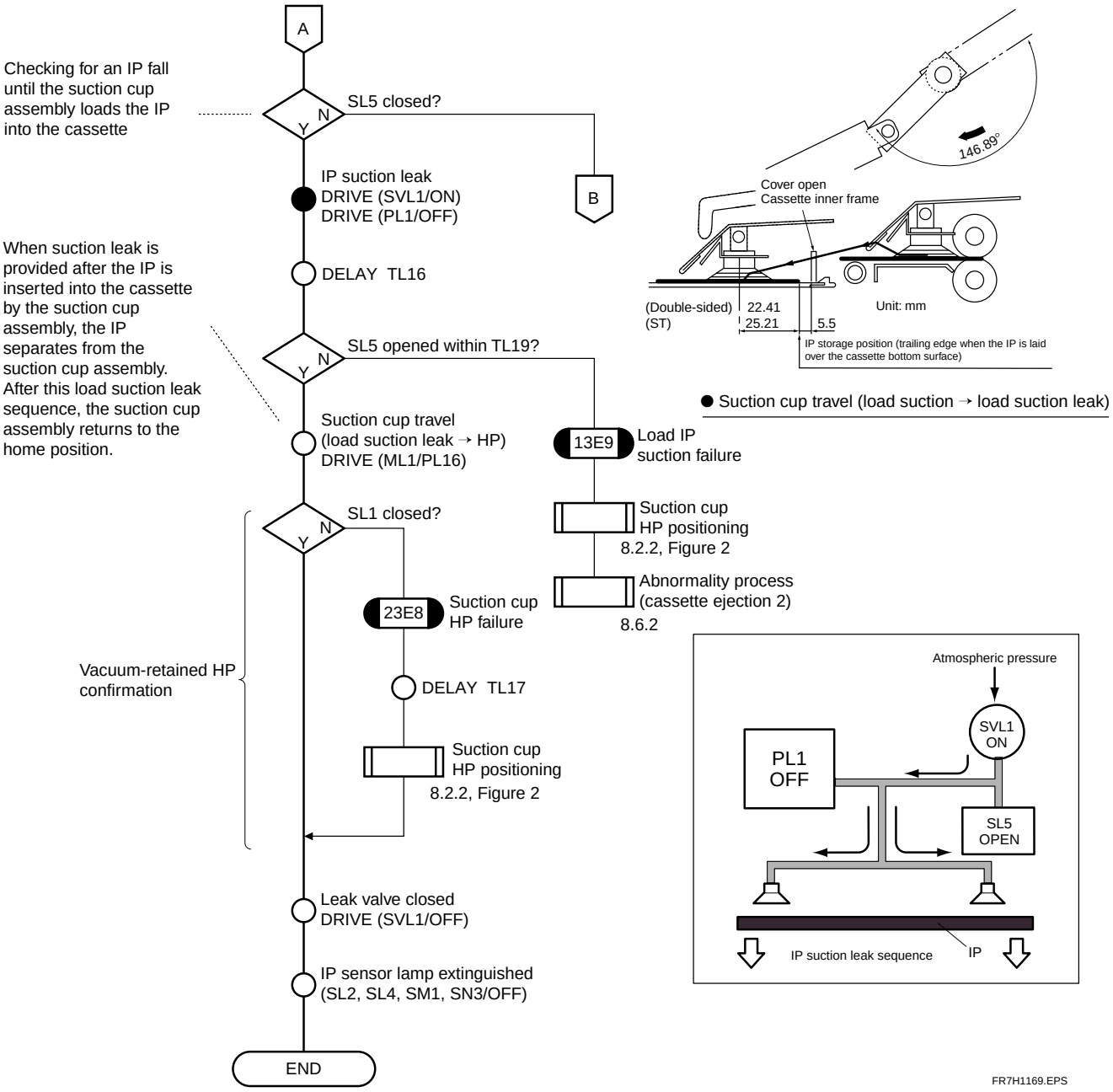


Table 8.2.17.1 Operation Parameters

Symbol	Description	Value
NL11	Hold release retry	5 times
PL14	Suction cup travel (HP → loading standby)	CCW 135 P
PL15	Suction cup travel (loading standby → load suction)	CW 110 P
PL16	Suction cup travel (load suction → load suction leak)	CW 530 P
PL25	Conveyance (load suction synchronization)	0x7FFFFF
TL16	Wait for load suction leak	0.1 sec
TL17	Wait for next operation	0.1 sec
TL19	Wait for suction leak	5 sec
TL11	Feed suction timeout	1 sec

0x7FFFFF: Infinitely CW

TR7H1173.EPS

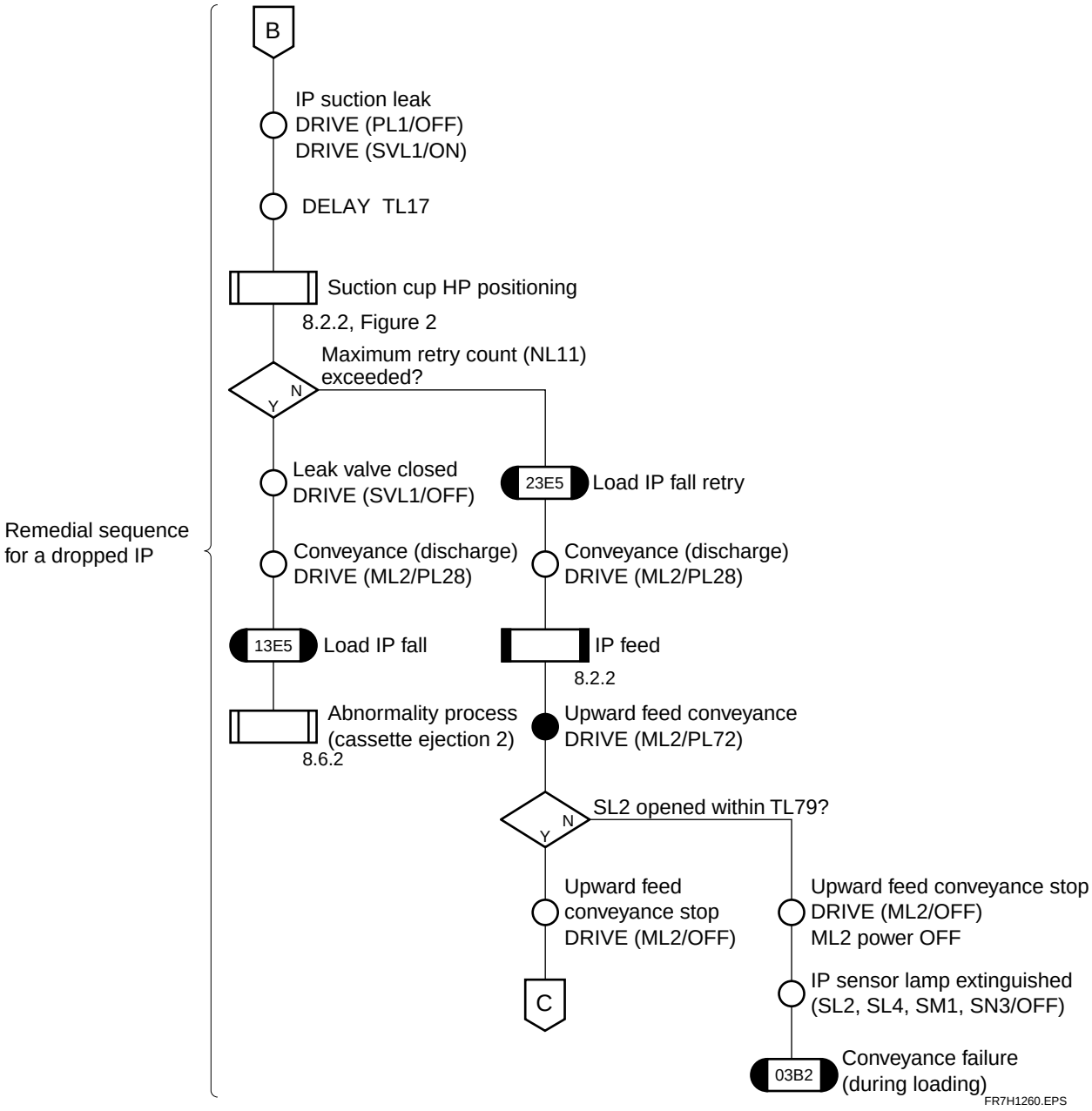


Table 8.2.17.2 Operation Parameters

Symbol	Description	Value
NL11	Feed suction retry	3 times
PL28	Conveyance (discharge)	CW 5400 P
TL17	Wait for next operation	0.1 sec
TL79	Feed/load conveyance remaining IP transfer timeout 2	10.7 sec

TR7H1174.EPS

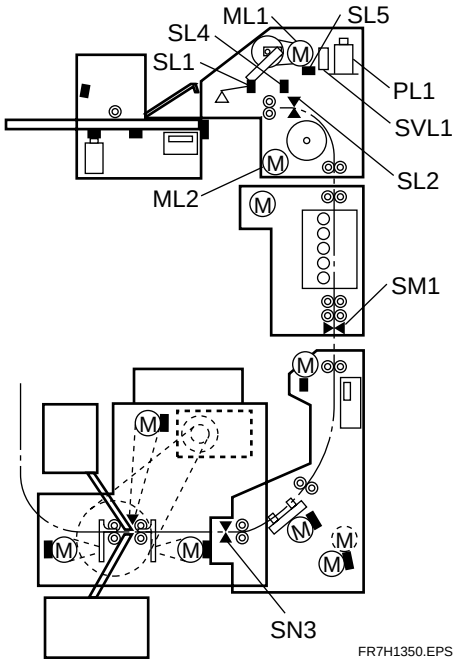
Table 8.2.17.3 Operation Parameter

Symbol	Description	Mode	Value
PL72	Initialization conveyance (upward)	ST	0x7FFFFF
		HR (nonstandard IPs included)	0x7FFFFF

0x7FFFFF: Infinitely CW
Unit: P

TR7H1221.EPS

<I/O arrangement diagram>



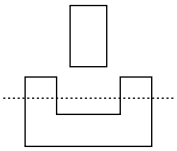
<I/O list>

Symbol	Name	Type	Function/remarks
ML1	Suction cup driving motor	Pulse motor	Opens the cassette rear cover and moves a roller.
ML2	IP conveyance motor	Pulse motor	Conveys the IP.
PL1	IP suction pump	DC pump	When turned ON, this pump produces a vacuum.
SL1	Suction cup HP sensor	PI (5 mm)	Detects the removal arm home position.
SL2	Cassette opening IP sensor	PI (19 mm)	IP transport sensor.
SL4	Inch/metric sensor	Reflection type	Determines the IP width.
SL5	Suction sensor	Suction sensor	IP suction sensor.
SM1	Before-BCR IP sensor	PI (19 mm)	IP transport sensor.
SN3	Side-positioning IP sensor	PI (19 mm)	IP transport sensor.
SVL1	IP suction leak valve	Solenoid valve	When turned ON, this valve provides suction leak.

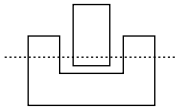
TR7H1114.EPS

<Sensor ON/OFF status>

SL1

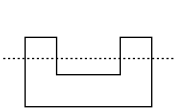


OFF: Open (not blocked)

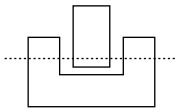


ON: Closed (blocked)

SL2/SM1/SN3

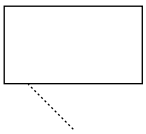


OFF: Open (IP not found)

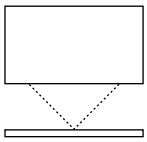


ON: Closed (IP found)

SL4



OFF (0): Open



ON (1): Closed

FR7H1320.EPS

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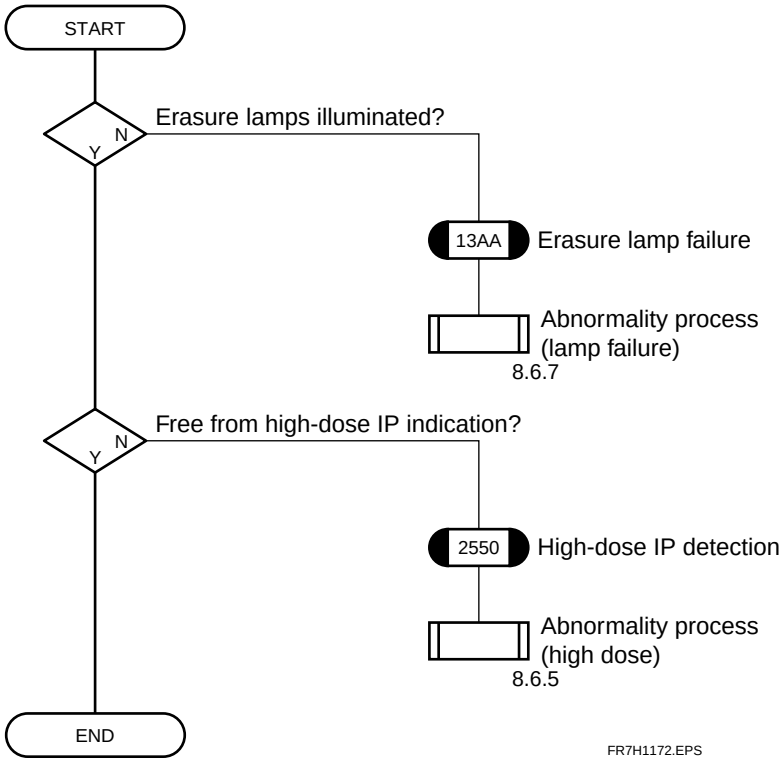
8.2.18 Erasure confirmation

<Figure 1 Erasure confirmation flowchart>



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8.2.19 Cassette ejection

<Figure 1 Cassette ejection flowchart>

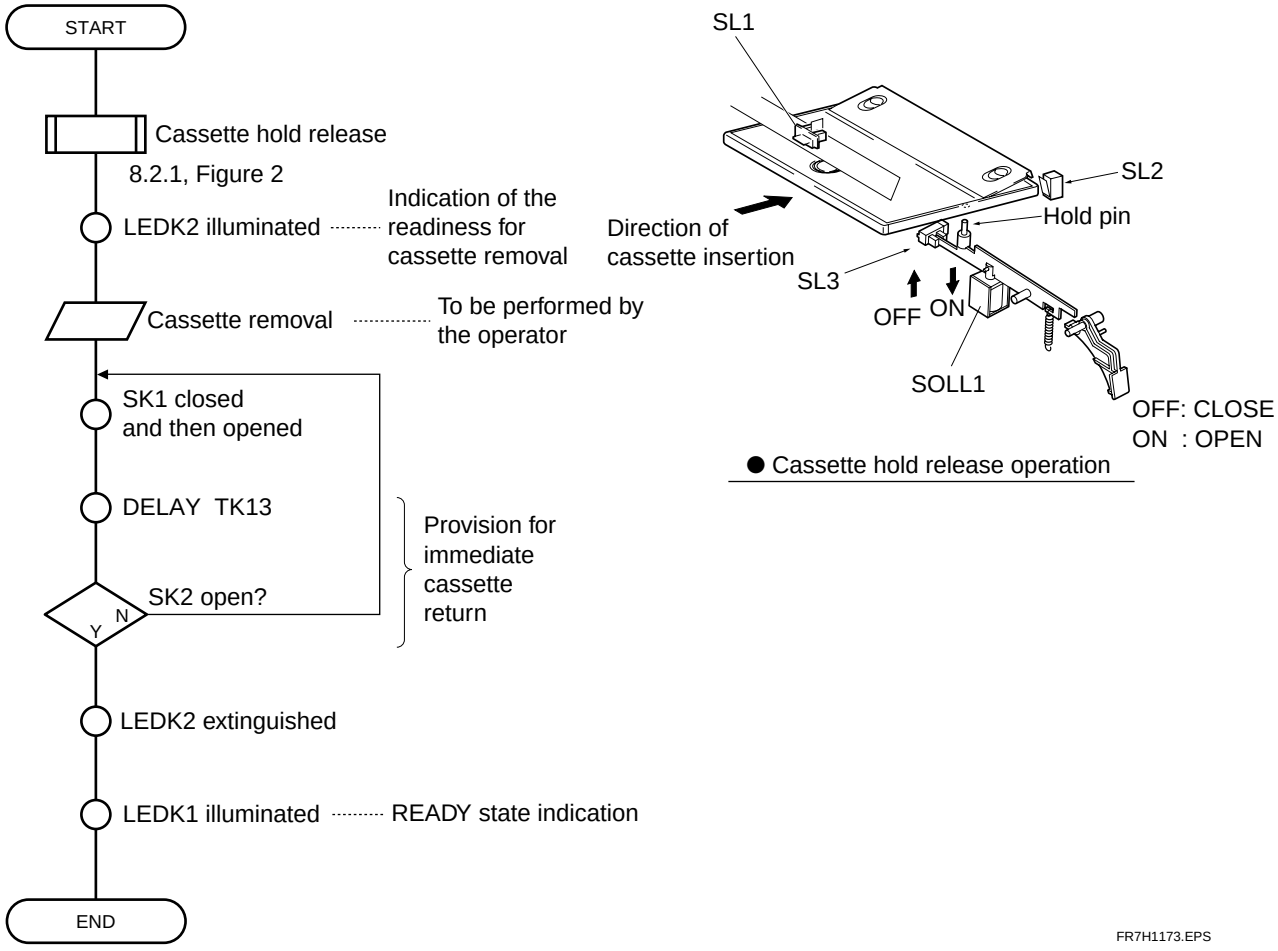
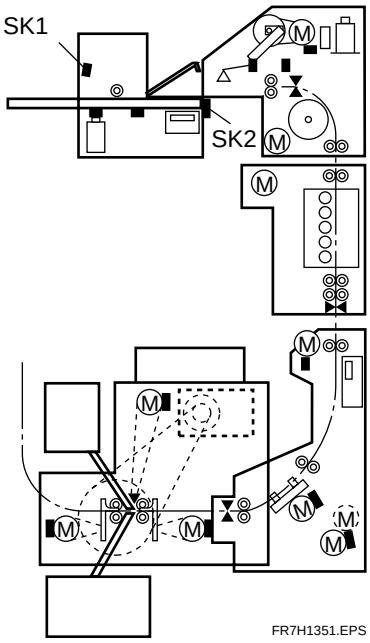


Table 8.2.19.1 Operation Parameter

Symbol	Description	Value
TK13	Wait for cassette removal	0.5 sec

TR7H1175.EPS

<I/O arrangement diagram>



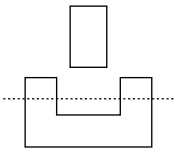
<I/O list>

Symbol	Name	Type	Function/remarks
SK1	Cassette ejection sensor	PI (5 mm)	Detects a cassette ejection.
SK2	Cassette IN sensor	Microswitch	The state of this sensor is ANDed with that of the SK3 to achieve recognition.

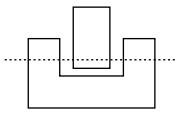
TR7H1115.EPS

<Sensor ON/OFF status>

SK1

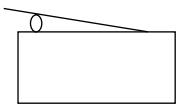


OFF: Open (not blocked)



ON: Closed (blocked)

SK2



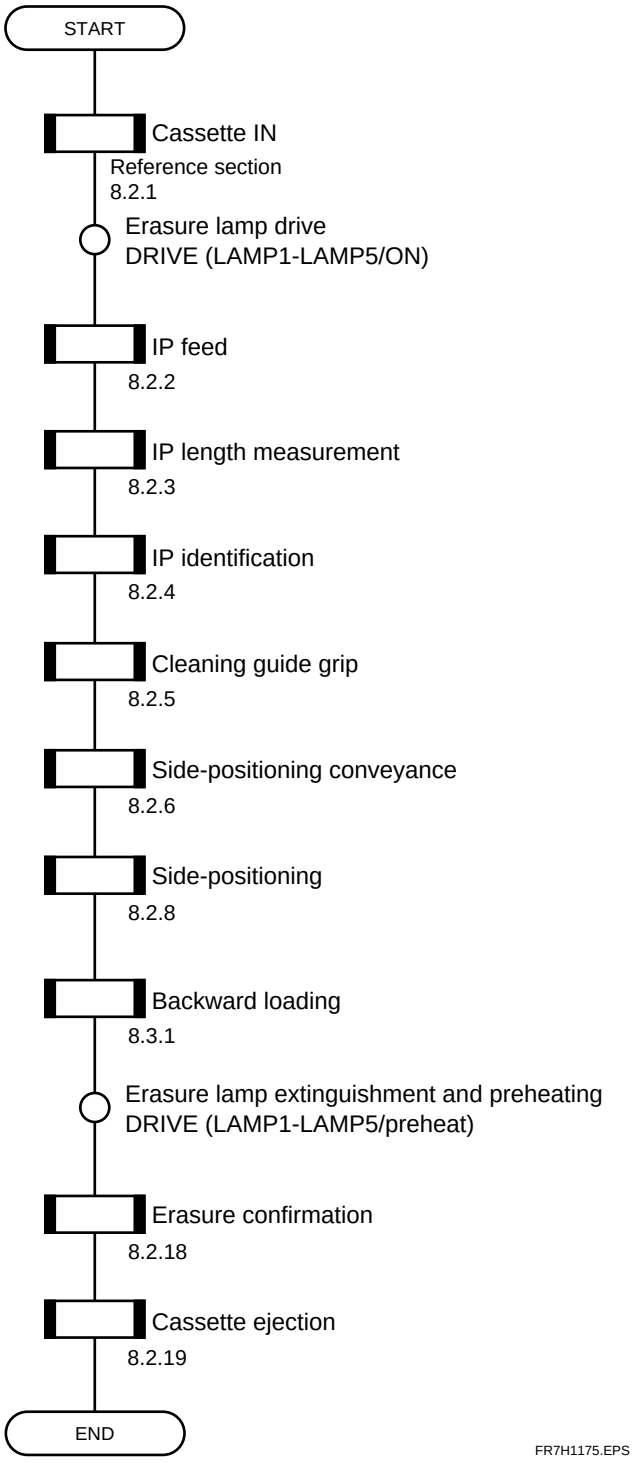
OFF: Open

ON: Closed

FR7H1321.EPS

8.3 Secondary Erasure Flowcharts

<Figure 1 Overall flowchart>



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8.3.1 Backward loading

<Figure 1 Backward loading flowchart>

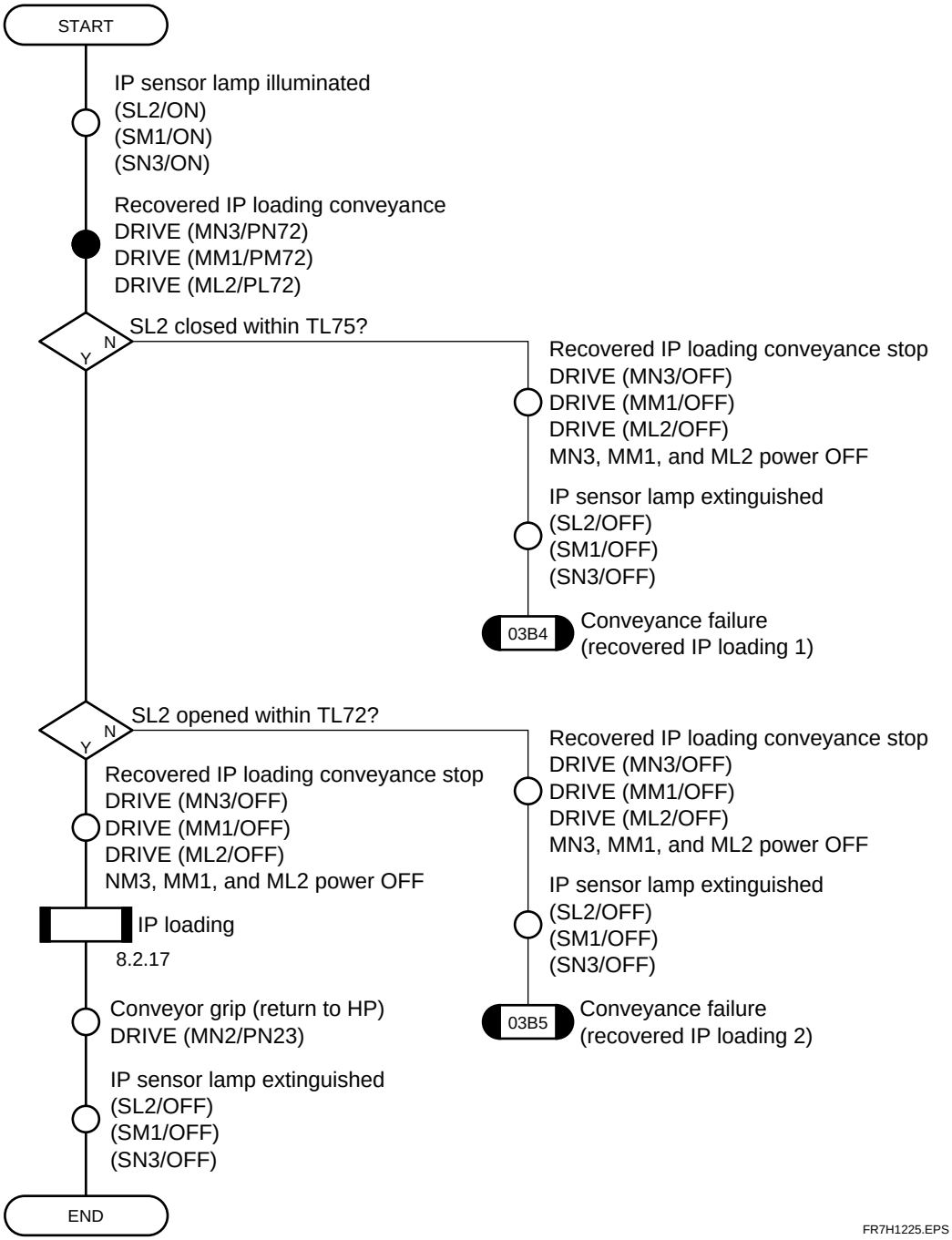


Table 8.3.1.1 Operation Parameters

Symbol	Description	Value
PM72	Initialization conveyance (upward)	0x7FFFFF
PN23	Conveyor grip (return to HP)	CW 400 P
PN72	Initialization conveyance (upward)	0x7FFFFF
TL72	Feed/load conveyance remaining IP ejection timeout	7.6 sec
TL75	Before-reading standby remaining IP ejection timeout	14.5 sec

0x7FFFFF: Infinitely CW

TR7H1195.EPS

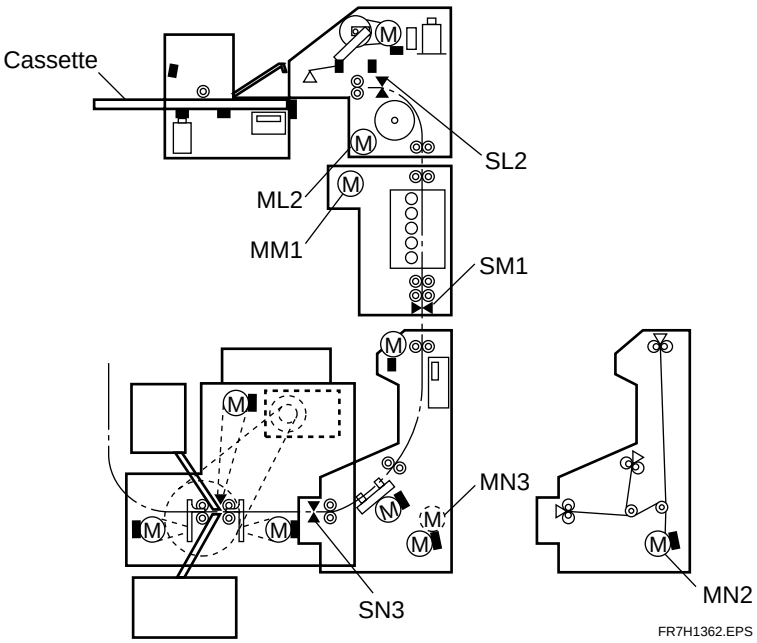
Table 8.3.1.2 Operation Parameter

Symbol	Description	Mode	Value
PL72	Initialization conveyance (upward)	ST	0x7FFFFF
		HR (nonstandard IPs included)	0x7FFFFF

0x7FFFFF: Infinitely CW
Unit: P

TR7H1222.EPS

<I/O arrangement diagram>



FR7H1362.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
ML2	IP conveyance motor	Pulse motor	Conveys the IP.
MM1	IP conveyance motor	Pulse motor	Conveys the IP.
MN2	Grip release motor	Pulse motor	Grips/releases a roller.
MN3	IP conveyance motor	Pulse motor	Conveys the IP.
SL2	Cassette opening IP sensor	PI (19 mm)	IP transport sensor.
SM1	Before-BCR IP sensor	PI (19 mm)	IP transport sensor.
SN3	Side-positioning IP sensor	PI (19 mm)	IP transport sensor.

TR7H1126.EPS

<Sensor ON/OFF status>

SL2/SM1/SN3

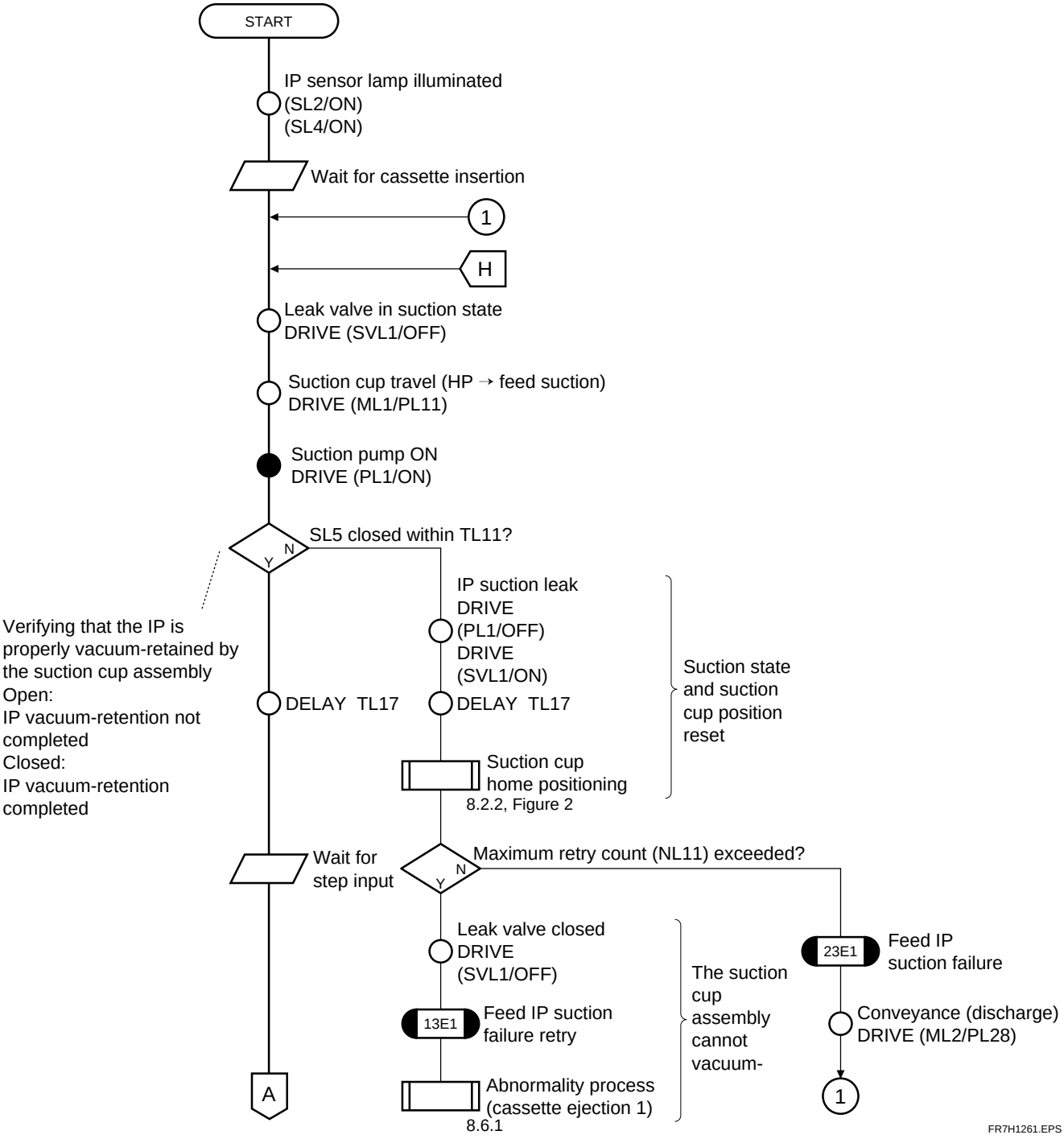
OFF: Open (IP not found) ON: Closed (IP found)

FR7H1332.EPS

8.4 Step Operation Flowcharts

8.4.1 Feed/load step operation

<Figure 1 Feed/load step operation flowchart>



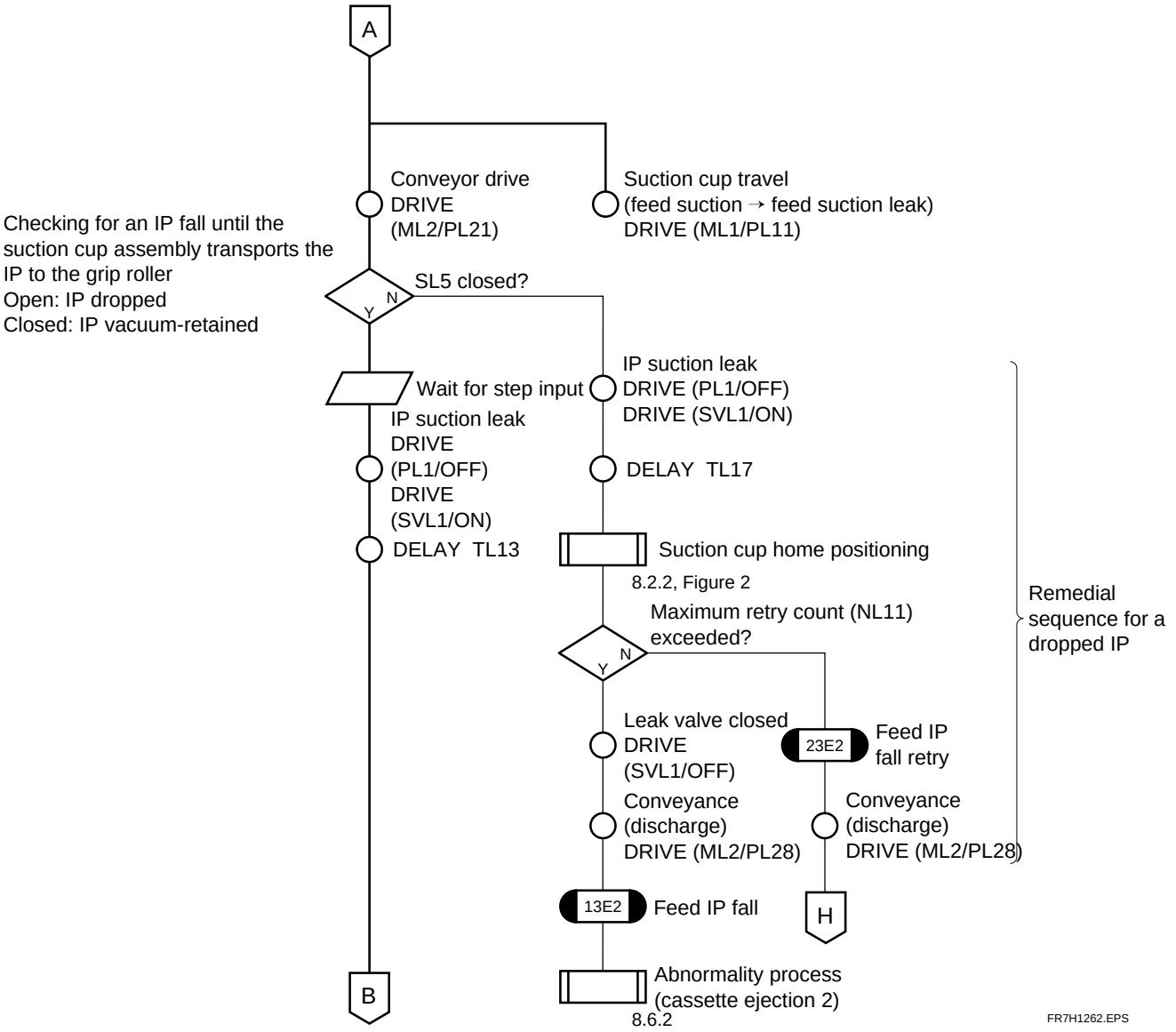


Table 8.4.1.1 Operation Parameters

Symbol	Description	Value
NL11	Feed suction retry	3 times
PL11	Suction cup travel (HP → feed suction)	CW 505 P
PL21	Conveyance (feed suction synchronization)	CCW 1350 P
PL28	Conveyance (discharge)	CW 5400 P
TL11	Feed suction timeout	1 sec
TL13	Wait for feed suction leak	0.1 sec
TL17	Wait for next operation	0.1 sec

TR7H1196.EPS

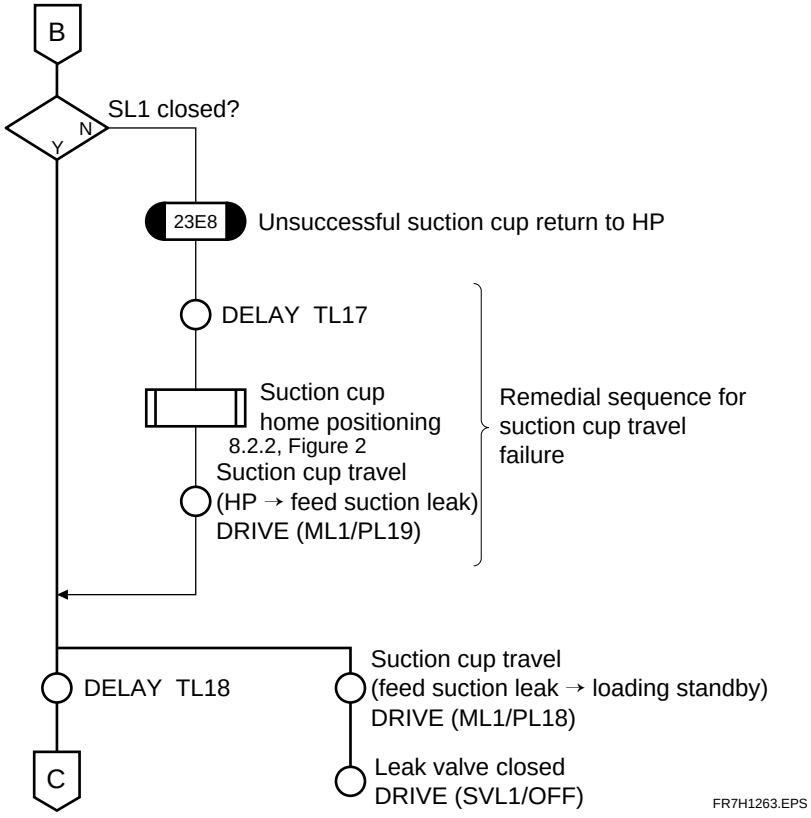


Table 8.4.1.2 Operation Parameters

Symbol	Description	Value
NL11	Feed suction retry	3 times
PL18	Suction cup travel (feed suction leak → loading standby)	CCW 110 P
PL19	Suction cup travel (HP → feed suction leak)	CCW 25 P
PL26	Conveyance (grip retry)	0xFFFFFF
PL27	Conveyance (IP positioning for maintenance)	CCW 1430 P
PL28	Conveyance (discharge)	CW 5400 P
TL17	Wait for next operation	0.1 sec
TL18	Wait for feed	0.05 sec
TL22	Loading timeout	6 sec

0xFFFFFF: Infinitely CCW

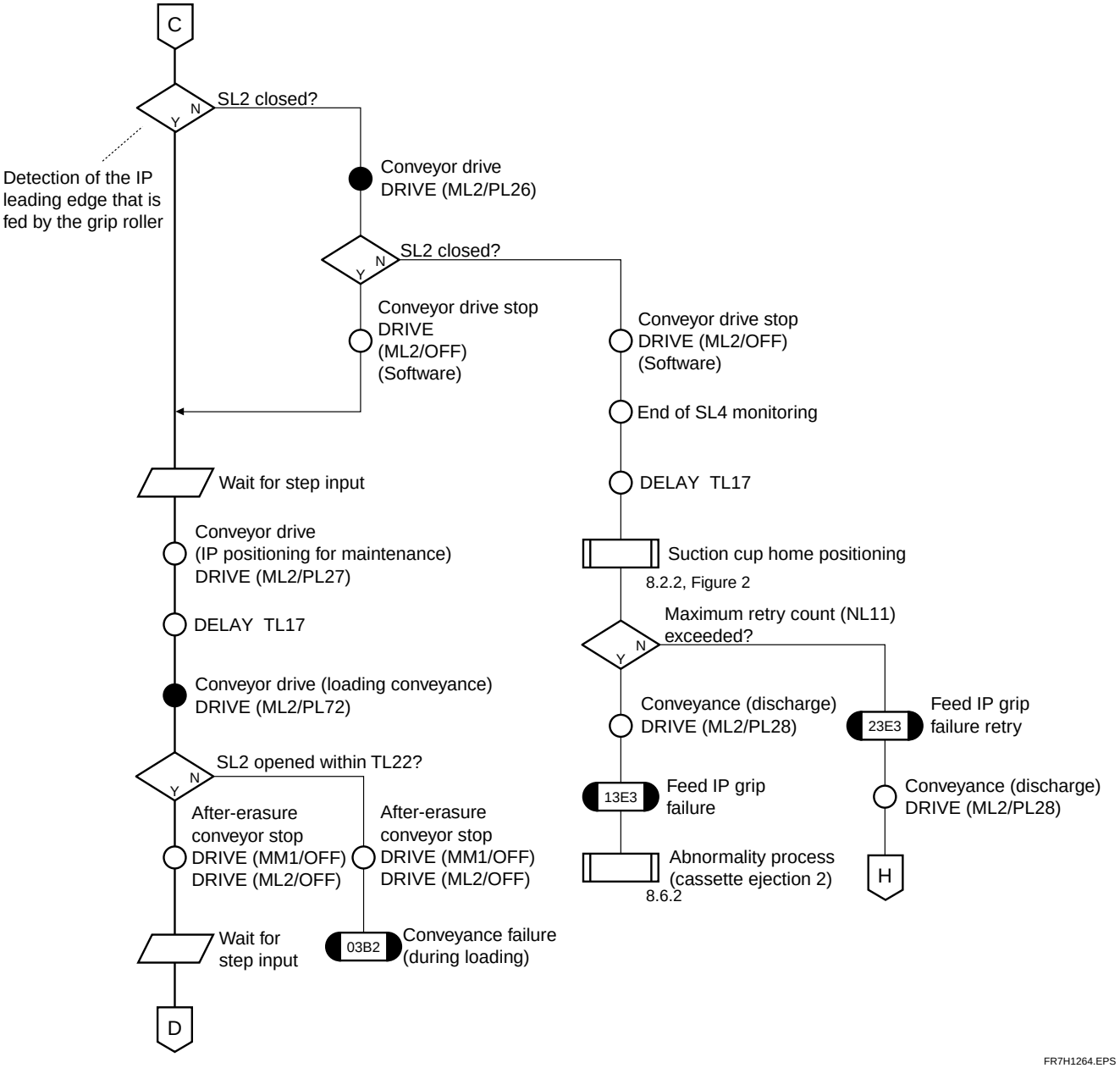
TR7H1197.EPS

Table 8.4.1.3 Operation Parameter

Symbol	Description	Mode	Value
PL72	Initialization conveyance (upward)	ST	0x7FFFFF
		HR (nonstandard IPs included)	0x7FFFFF

0x7FFFFF: Infinitely CW
Unit: P

TR7H1223.EPS


C
SL2 closed?
N
Y
Detection of the IP leading edge that is fed by the grip roller
Conveyor drive
DRIVE (ML2/PL26)
SL2 closed?
N
Y
Conveyor drive stop
DRIVE
(ML2/OFF)
(Software)
Conveyor drive stop
DRIVE (ML2/OFF)
(Software)
End of SL4 monitoring
Wait for step input
DELAY TL17
Conveyor drive
(IP positioning for maintenance)
DRIVE (ML2/PL27)
Suction cup home positioning
8.2.2, Figure 2
DELAY TL17
Maximum retry count (NL11) exceeded?
N
Y
Conveyor drive (loading conveyance)
DRIVE (ML2/PL72)
Conveyance (discharge)
DRIVE (ML2/PL28)
23E3
Feed IP grip failure retry
SL2 opened within TL22?
N
Y
13E3
Feed IP grip failure
Conveyance (discharge)
DRIVE (ML2/PL28)
After-erasure conveyor stop
DRIVE (MM1/OFF)
DRIVE (ML2/OFF)
After-erasure conveyor stop
DRIVE (MM1/OFF)
DRIVE (ML2/OFF)
Abnormality process
(cassette ejection 2)
8.6.2
H
Wait for step input
03B2
Conveyance failure (during loading)
D
FR7H1264.EPS

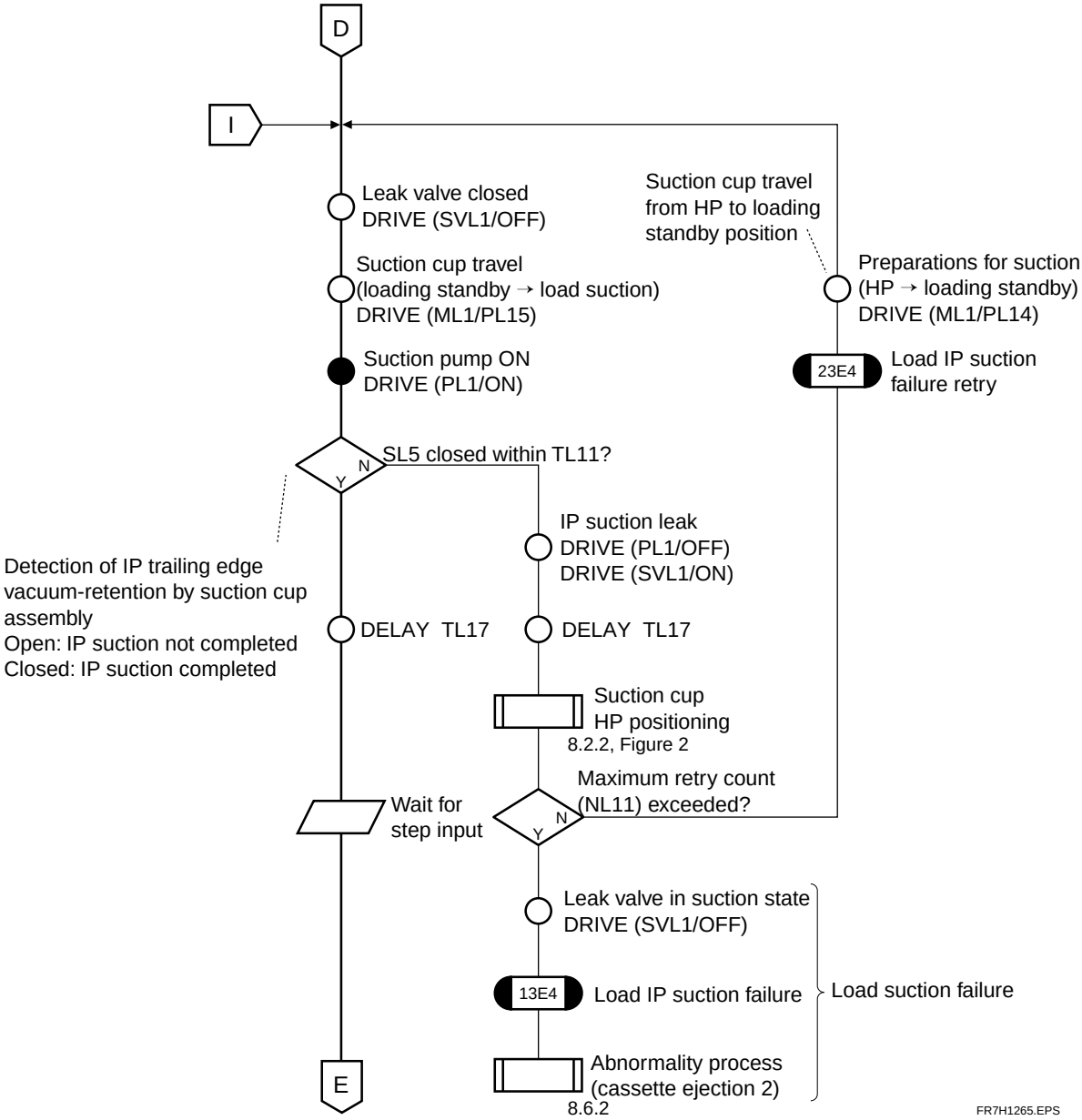


Table 8.4.1.4 Operation Parameters

Symbol	Description	Value
NL11	Feed suction retry	3 times
PL14	Suction cup travel (HP → loading standby)	CCW 135 P
PL15	Suction cup travel (loading standby → load suction)	CW 110 P
PL16	Suction cup travel (load suction → load suction leak)	CW 530 P
PL25	Conveyance (load suction synchronization)	0x7FFFFF
PL28	Conveyance (discharge)	CW 5400 P
TL16	Wait for load suction leak	0.1 sec
TL17	Wait for next operation	0.1 sec

0x7FFFFF: Infinitely CW

TR7H1198.EPS

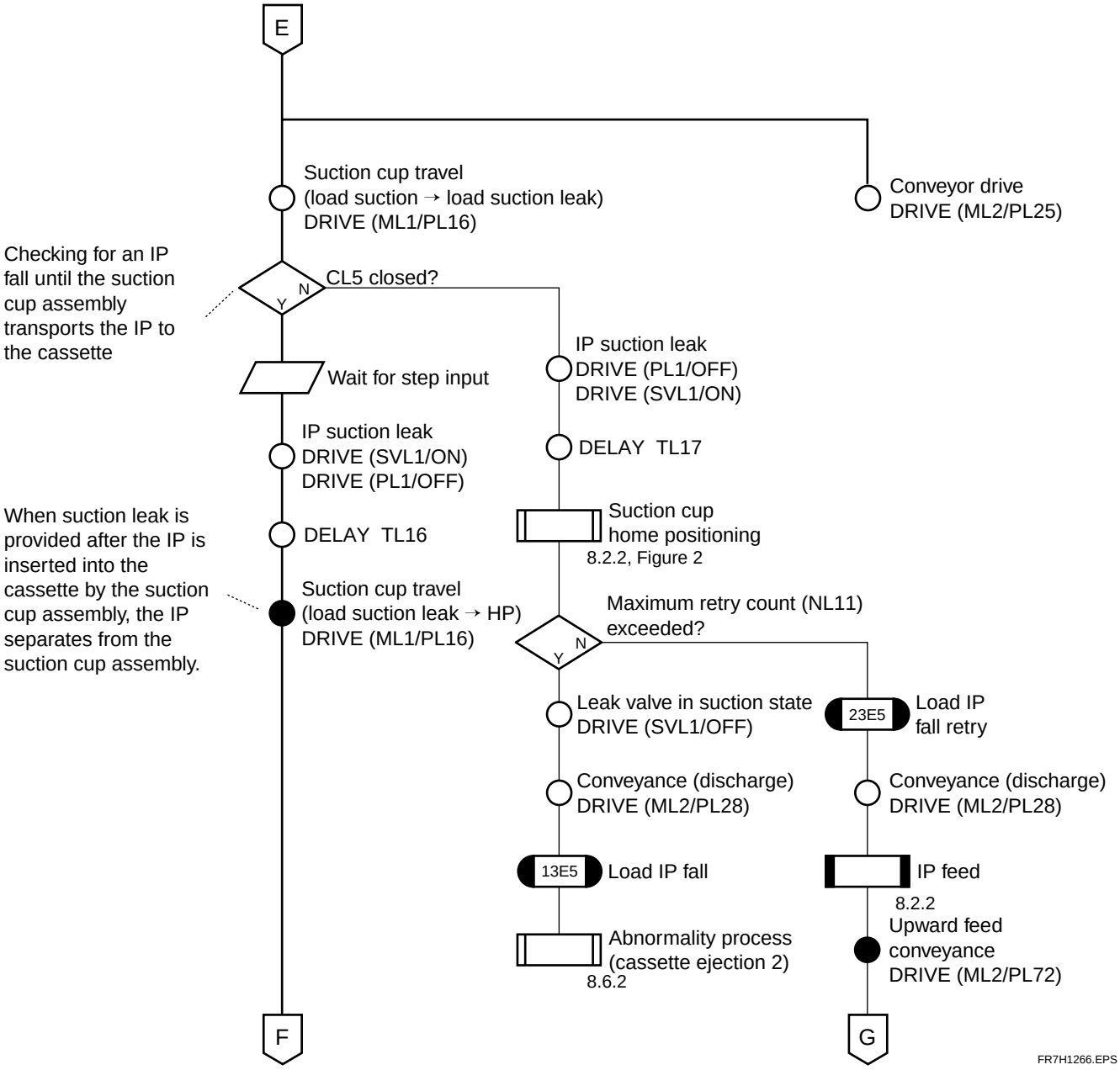


Table 8.4.1.5 Operation Parameter

Symbol	Description	Mode	Value
PL72	Initialization conveyance (upward)	ST	0x7FFFFF
		HR (nonstandard IPs included)	0x7FFFFF

0x7FFFFF: Infinitely CW
Unit: P

TR7H1224.EPS

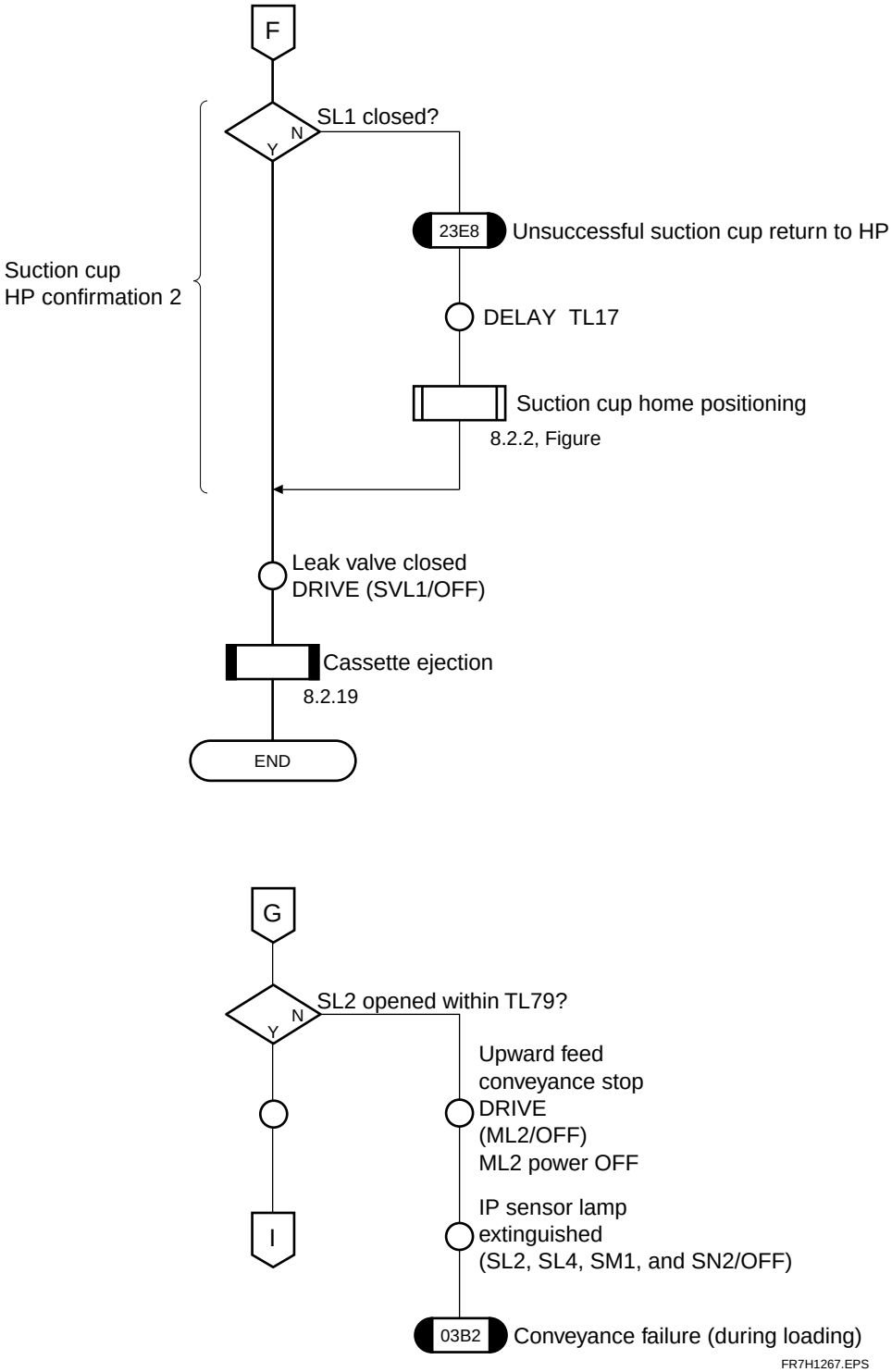
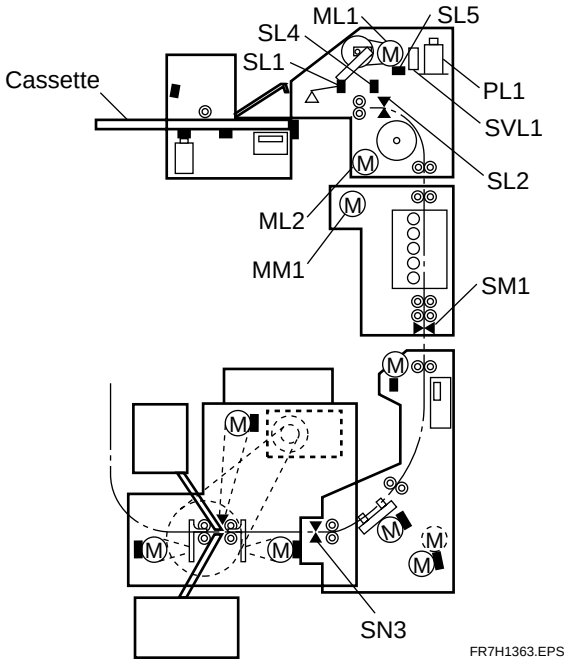


Table 8.4.1.6 Operation Parameters

Symbol	Description	Value
TL17	Wait for next operation	0.1 sec
TL79	Feed/load conveyance remaining IP transfer timeout 2	10.7 sec

TR7H1199.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
ML1	Suction cup driving motor	Pulse motor	Opens the cassette rear cover and moves a roller.
ML2	IP transport motor	Pulse motor	Conveys the IP.
MM1	IP transport motor	Pulse motor	Conveys the IP.
PL1	IP suction pump	DC pump	When turned ON, this pump produces a vacuum.
SL1	Suction cup HP sensor	PI (5 mm)	Detects the IP removal arm HP.
SL2	Cassette opening IP sensor	PI (19 mm)	IP transport sensor.
SL4	Inch/metric sensor	Reflection type	Determines the IP width.
SL5	Suction sensor	Suction sensor	IP suction sensor.
SM1	Before-BCR IP sensor	PI (19 mm)	IP transport sensor.
SN3	Side-positioning IP sensor	PI (19 mm)	IP transport sensor.
SVL1	IP suction leak valve	Solenoid valve	When turned ON, this valve provides suction leak.

TR7H1127.EPS

<Sensor ON/OFF status>

SL1

OFF: Open (not blocked)　　ON: Closed (blocked)

SL2/SM1/SN3

OFF: Open (IP not found)　　ON: Closed (IP found)

SL4

OFF (0): Open　　ON (1): Closed

FR7H1333.EPS

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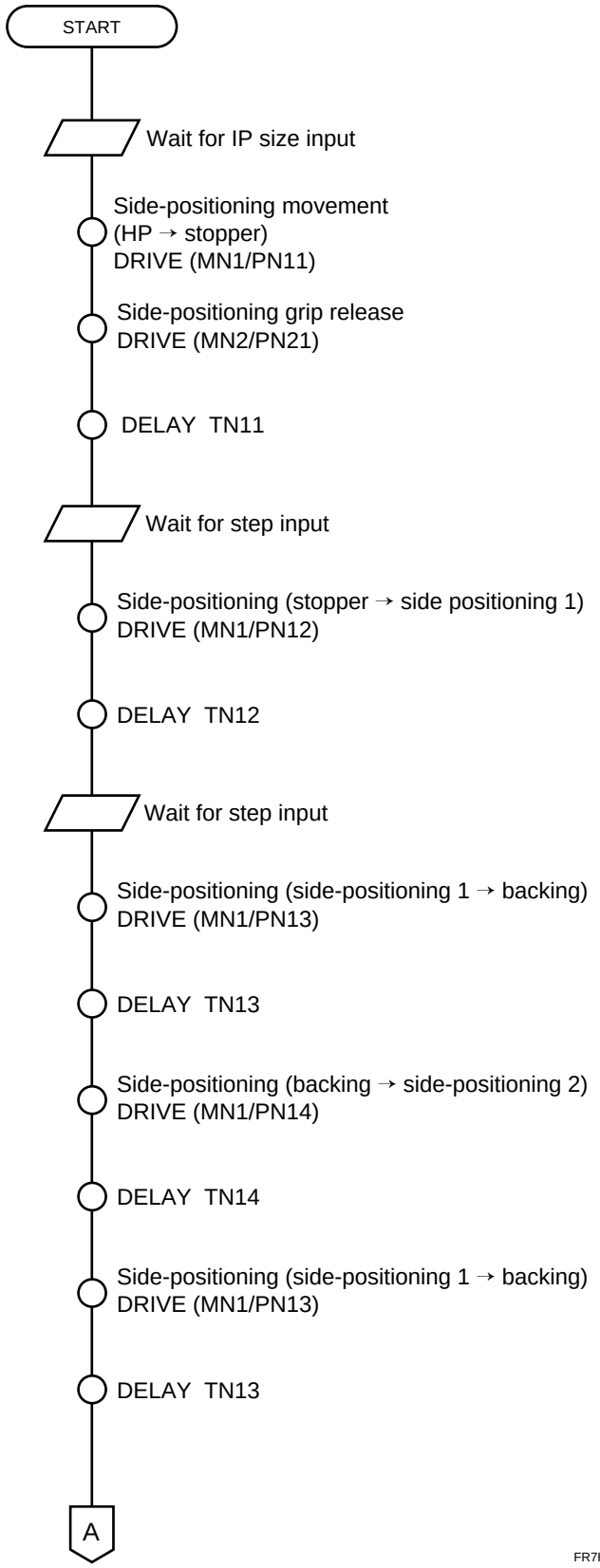
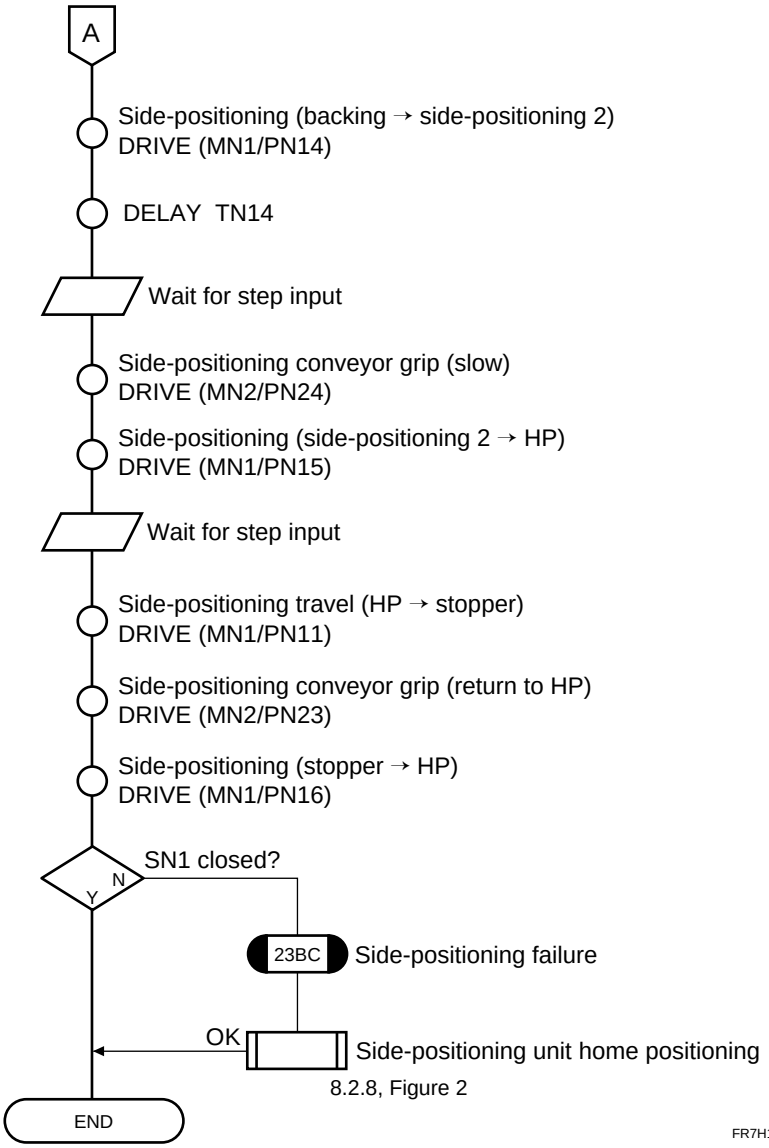
8.4.2 Side-positioning step operation

<Figure 1 Side-positioning step operation flowchart>



FR7H1269.EPS



FR7H1270.EPS

Table 8.4.2.1 Operation Parameters

Symbol	Description	14" x 17"	14" x 14"	10" x 12"	8" x 10"	1824ST	2430ST	1824HR	2430HR
PN12	Side-positioning (stopper → side-positioning 1)	65	65	745	745	839	839	827	427
PN13	Side-positioning (side-positioning 1 → backing)	-68	-68	-68	-68	-68	-68	-34	-34
PN14	Side-positioning (backing → side-positioning 2)	68	68	68	68	68	68	34	34
PN15	Side-positioning (side-positioning 2 → backing)	-129	-129	-809	-809	-903	-903	-891	-491

Unit: P

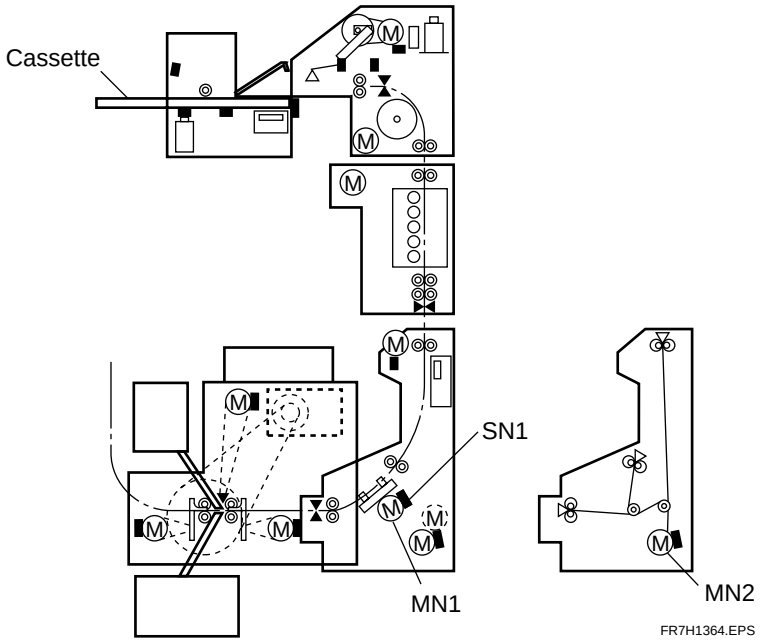
Direction of rotation: CW for positive values or CCW for negative values

Table 8.4.2.2 Operation Parameters

Symbol	Description	Value
PN11	Side-positioning (HP → stopper)	CW 64 P
PN16	Side-positioning (stopper → HP)	CCW 64 P
PN21	Conveyor grip release	CW 256 P
PN23	Conveyor grip (return to HP)	CW 400 P
PN24	Conveyor grip (slow)	CW 144 P
TN11	Wait for IP halt before side-positioning	0.2 sec
TN12	Wait for side-positioning backing	0.02 sec
TN13	Wait for second side-positioning	0.02 sec
TN14	Wait for side-positioned IP halt	0.02 sec

TR7H1200.EPS

<I/O arrangement diagram>



FR7H1364.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
MN1	Side-positioning motor	Pulse motor	Drives the side-positioning mechanism.
MN2	Grip release motor	Pulse motor	Grips/releases a roller.
SN1	Side-positioning mechanism HP sensor	PI (5 mm)	Detects the side-positioning mechanism HP.

TR7H1128.EPS

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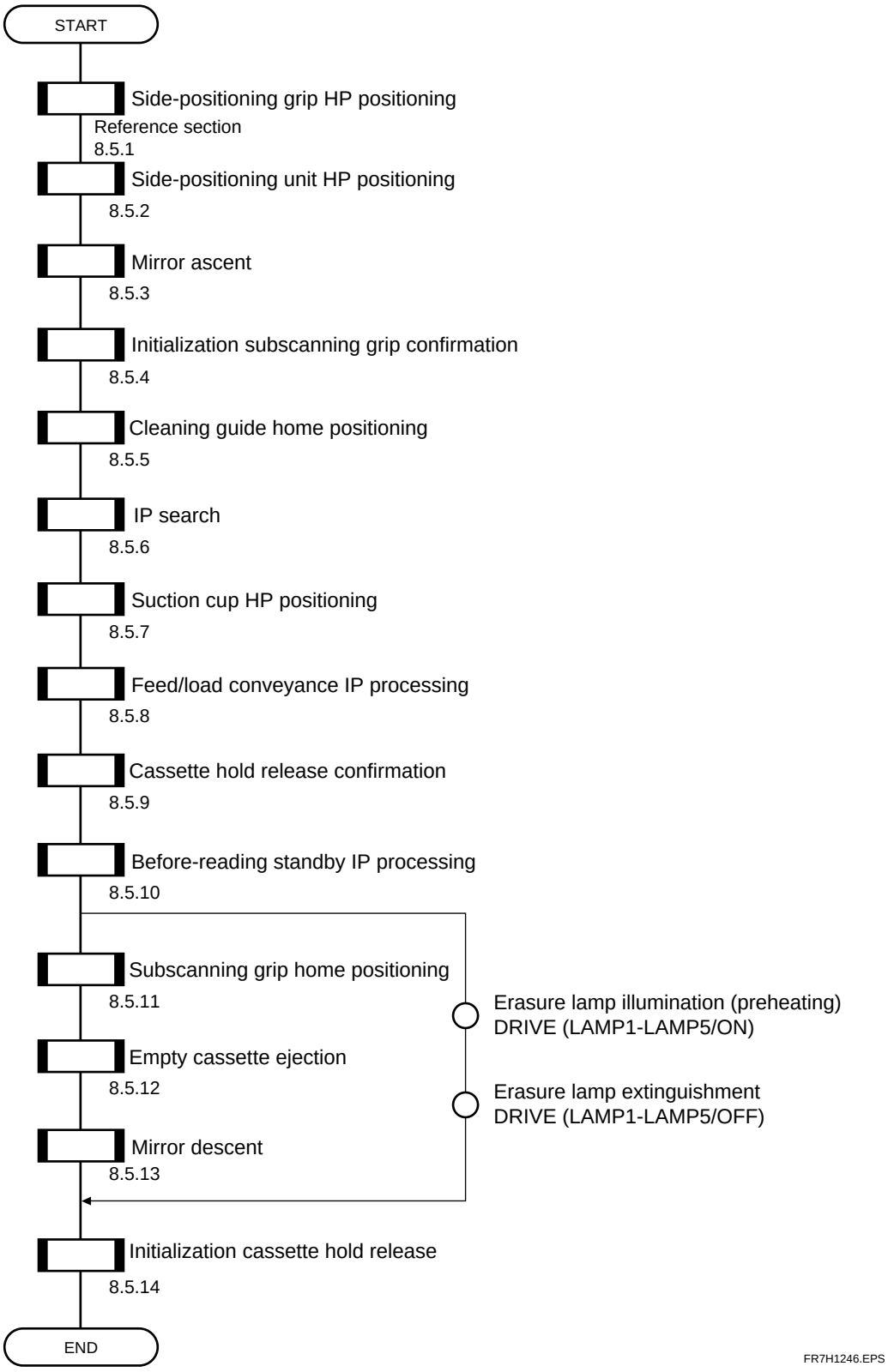
8.5 Initialization Flowcharts

<Figure 1 Overall flowchart>



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8.5.1 Side-positioning grip home positioning

<Figure 1 Side-positioning grip home positioning flowchart>

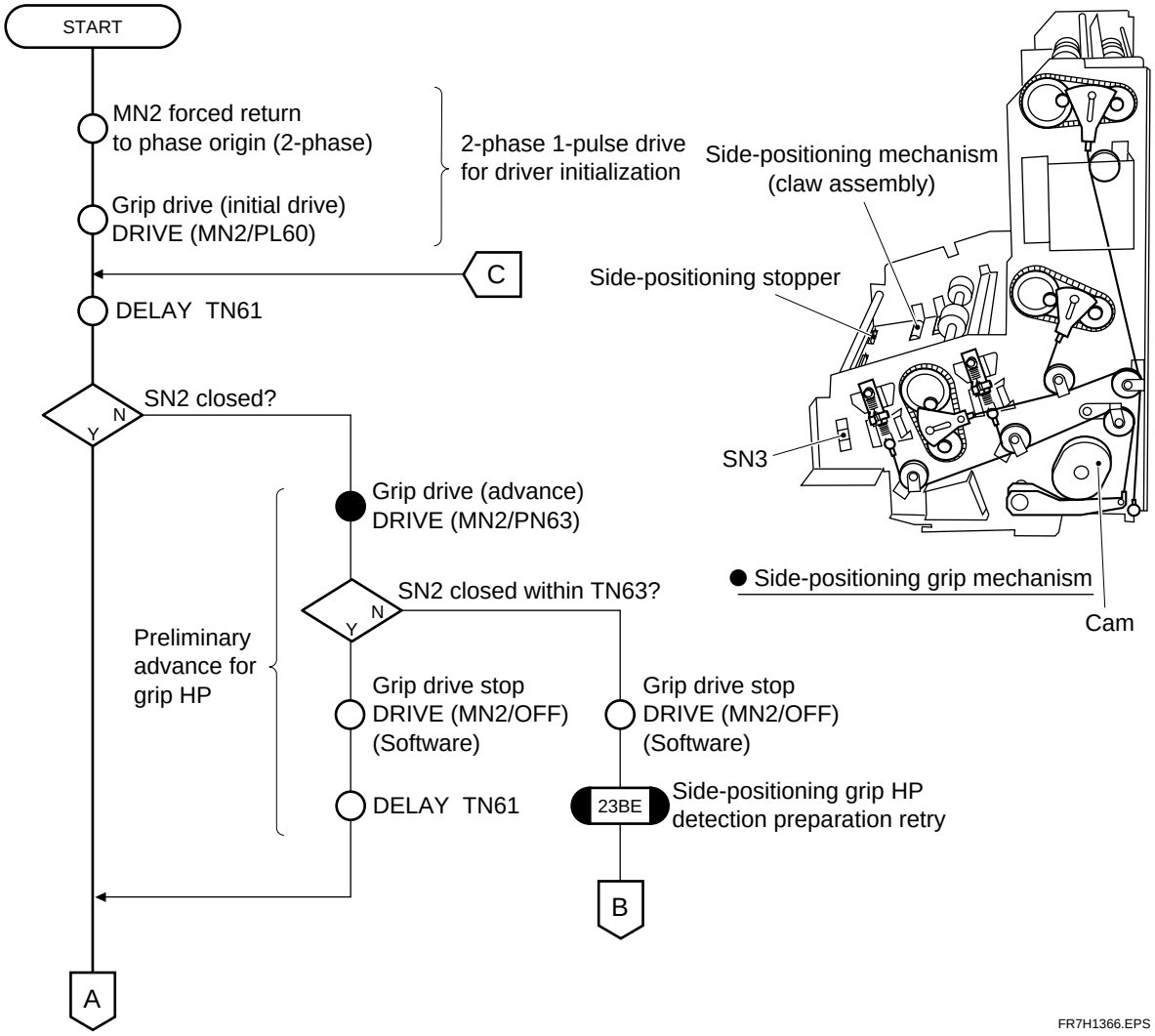
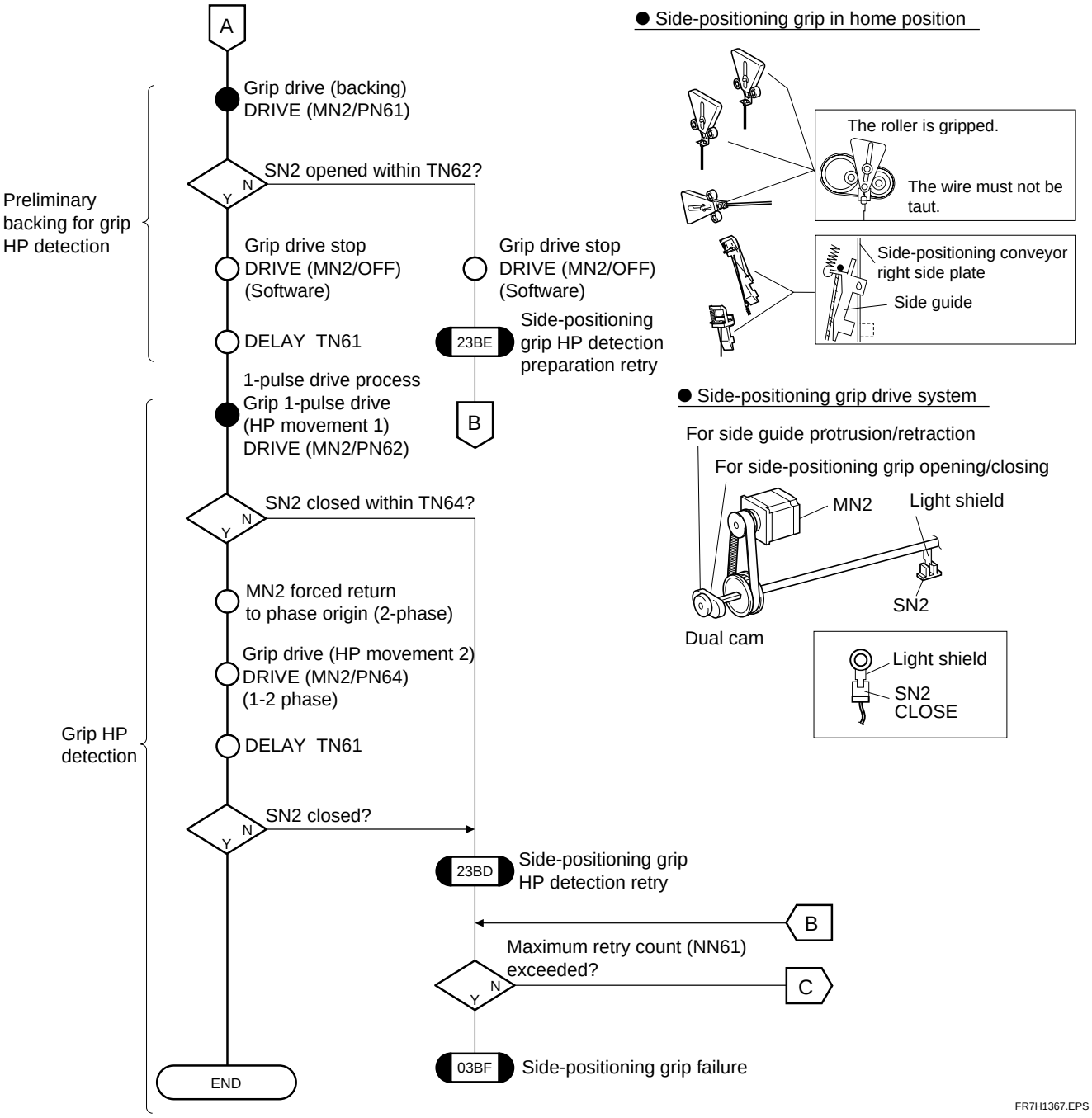


Table 8.5.1.1 Operation Parameters

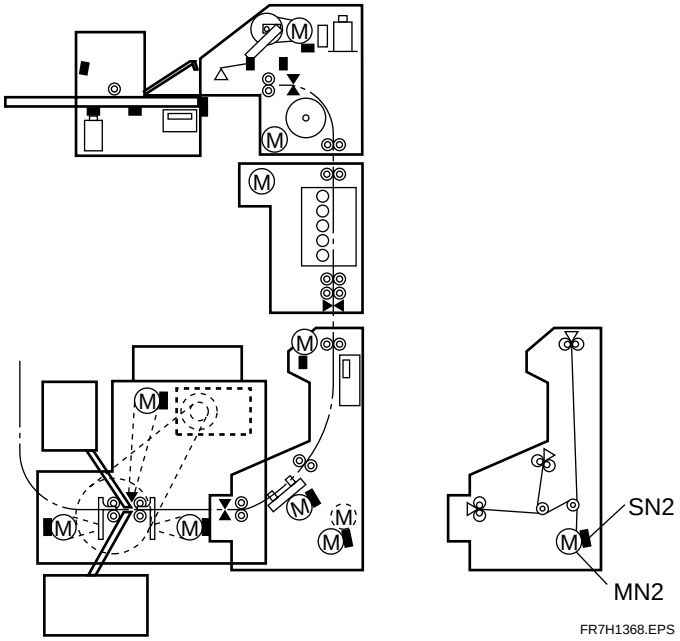
Symbol	Description	Value
NN61	Conveyor grip HP retry	3 times
PN60	Conveyor grip (initial drive)	CW 1 P
PN61	Conveyor grip (backing to HP)	0xFFFFFF
PN62	Conveyor grip 1-pulse drive (HP movement 1)	CW 1 P
PN63	Conveyor grip (advance to HP)	0x7FFFFF
PN64	Conveyor grip (HP movement 2)	CW 6 P
TN61	Wait for conveyor grip halt in home position	0.5 sec
TN62	Conveyor grip HP detection preparation timeout	1.2 sec
TN63	Conveyor grip HP detection timeout	13.3 sec
TN64	Conveyor grip 1-pulse drive timeout	10 sec

0x7FFFFF: Infinitely CW
0xFFFFFF: Infinitely CCW

TR7H1234.EPS


A
Grip drive (backing)
DRIVE (MN2/PN61)
SN2 opened within TN62?
N
Y
Preliminary backing for grip HP detection
Grip drive stop
DRIVE (MN2/OFF)
(Software)
DELAY TN61
Grip drive stop
DRIVE (MN2/OFF)
(Software)
23BE
Side-positioning grip HP detection preparation retry
B
1-pulse drive process
Grip 1-pulse drive
(HP movement 1)
DRIVE (MN2/PN62)
SN2 closed within TN64?
N
Y
MN2 forced return to phase origin (2-phase)
Grip drive (HP movement 2)
DRIVE (MN2/PN64)
(1-2 phase)
DELAY TN61
Grip HP detection
SN2 closed?
N
Y
23BD
Side-positioning grip HP detection retry
B
Maximum retry count (NN61) exceeded?
N
Y
C
03BF
Side-positioning grip failure
END
● Side-positioning grip in home position
The roller is gripped.
The wire must not be taut.
Side-positioning conveyor right side plate
Side guide
● Side-positioning grip drive system
For side guide protrusion/retraction
For side-positioning grip opening/closing
MN2
Light shield
SN2
Dual cam
Light shield
SN2
CLOSE
FR7H1367.EPS

<I/O arrangement diagram>



FR7H1368.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
MN2	Grip release motor	Pulse motor	Grips/releases a roller.
SN2	Grip release HP sensor	PI (5 mm)	Detects the roller grip release HP.

TR7H1235.EPS

<Sensor ON/OFF status>

FR7H1369.EPS

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8.5.2 Side-positioning unit home positioning

<Figure 1 Side-positioning unit home positioning flowchart>

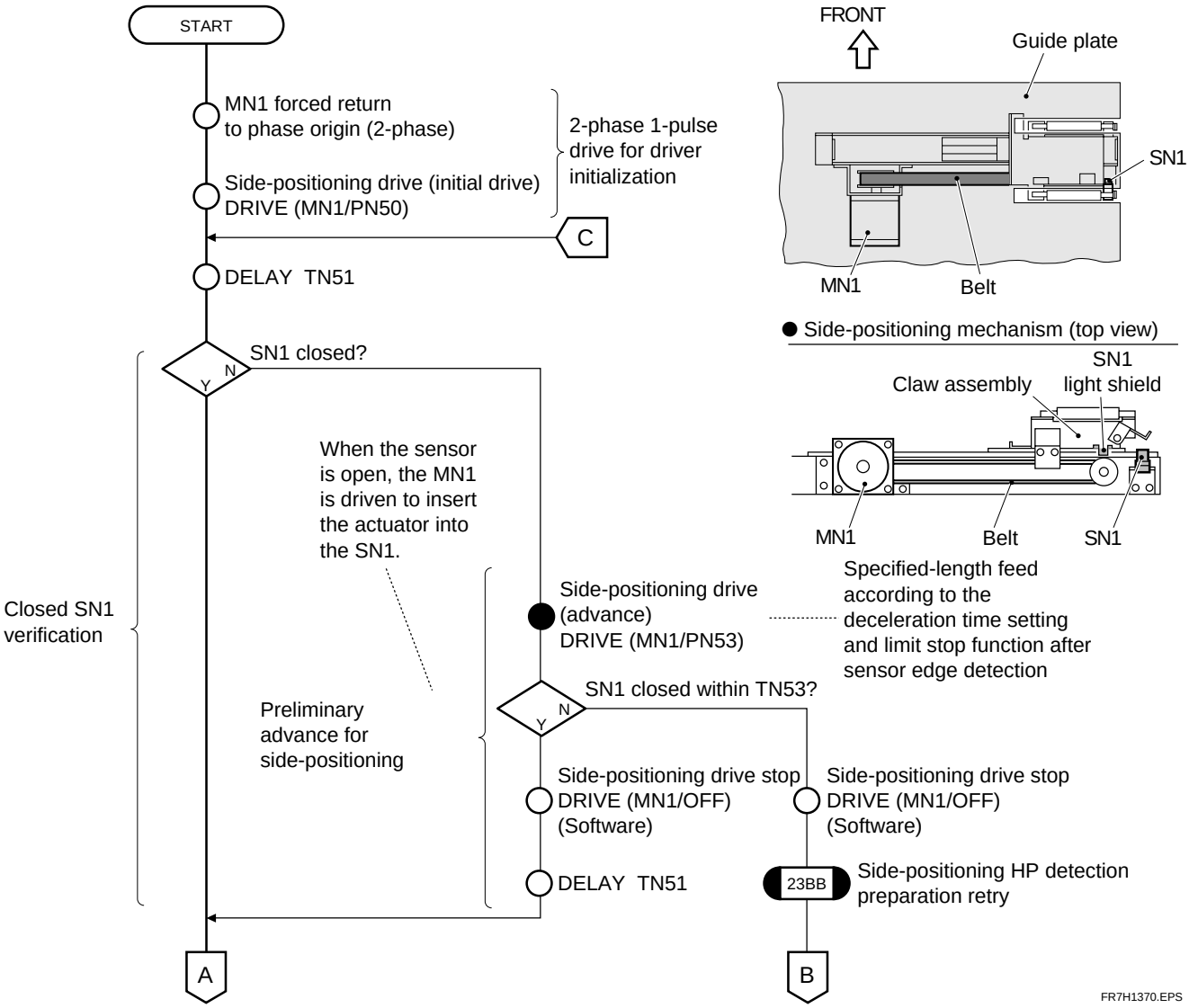
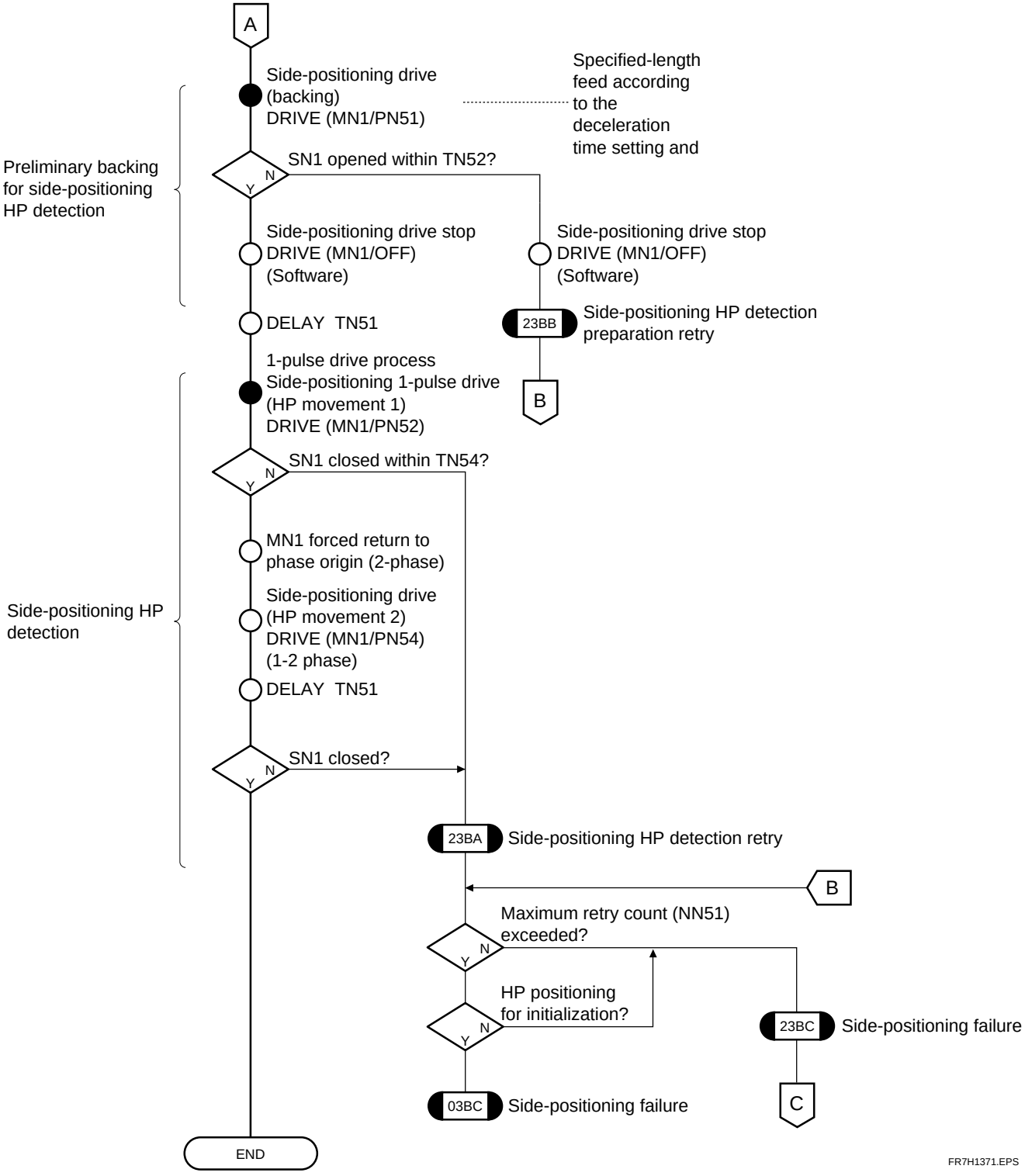


Table 8.5.2.1 Operation Parameters

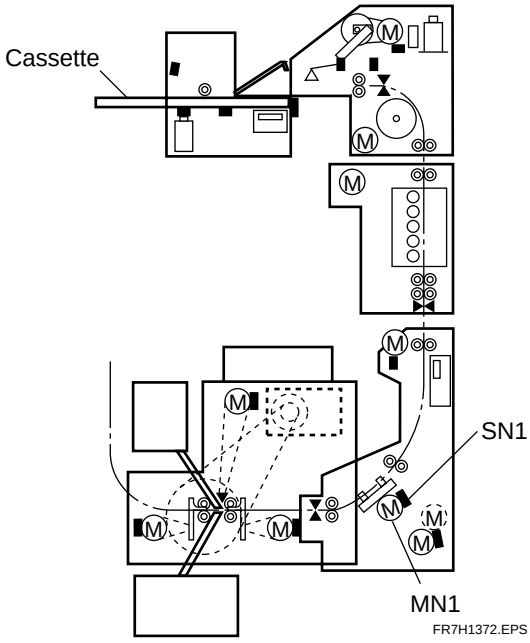
Symbol	Description	Value
NN51	Side-positioning unit HP retry	3 times
PN50	Side-positioning (initial drive)	CW 1 P
PN51	Side-positioning (backing to HP)	0x7FFFFF
PN52	Side-positioning 1-pulse drive (HP movement 1)	CCW 1 P
PN53	Side-positioning (advance to HP)	0xFFFFFF
PN54	Side-positioning (HP movement 2)	CCW 18 P
TN51	Wait for side-positioning unit halt in HP	0.5 sec
TN52	Side-positioning HP detection preparation timeout	1 sec
TN53	Side-positioning HP detection timeout	8 sec
TN54	Side-positioning unit HP 1-pulse drive timeout	10 sec

0x7FFFFF: Infinitely CW
0xFFFFFF: Infinitely CCW

TR7H1236.EPS


A
Side-positioning drive (backing) DRIVE (MN1/PN51)
Specified-length feed according to the deceleration time setting and
Preliminary backing for side-positioning HP detection
SN1 opened within TN52?
N
Y
Side-positioning drive stop DRIVE (MN1/OFF) (Software)
Side-positioning drive stop DRIVE (MN1/OFF) (Software)
DELAY TN51
23BB
Side-positioning HP detection preparation retry
B
1-pulse drive process
Side-positioning 1-pulse drive (HP movement 1) DRIVE (MN1/PN52)
SN1 closed within TN54?
MN1 forced return to phase origin (2-phase)
Side-positioning HP detection
Side-positioning drive (HP movement 2) DRIVE (MN1/PN54) (1-2 phase)
DELAY TN51
SN1 closed?
23BA
Side-positioning HP detection retry
B
Maximum retry count (NN51) exceeded?
HP positioning for initialization?
23BC
Side-positioning failure
03BC
Side-positioning failure
C
END
FR7H1371.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
MN1	Side-positioning motor	Pulse motor	Drives the side-positioning mechanism.
SN1	Side-positioning mechanism HP sensor	PI (5 mm)	Detects the side-positioning mechanism home position.

TR7H1237.EPS

<Sensor ON/OFF status>

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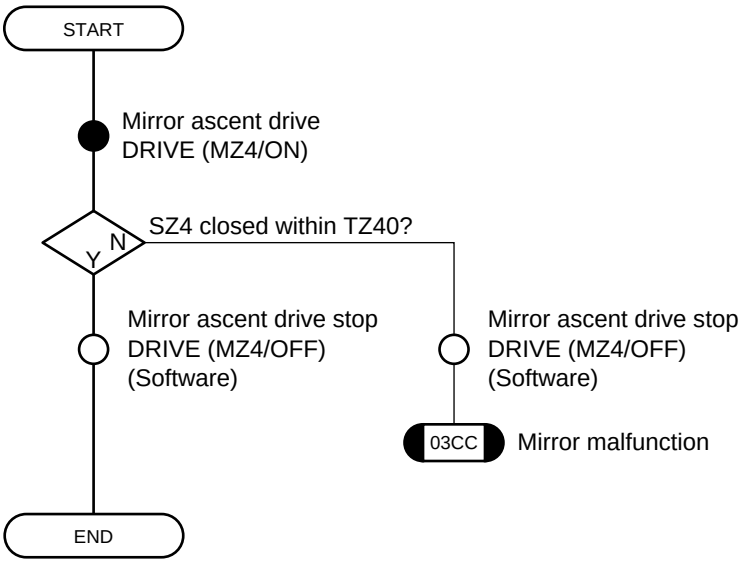
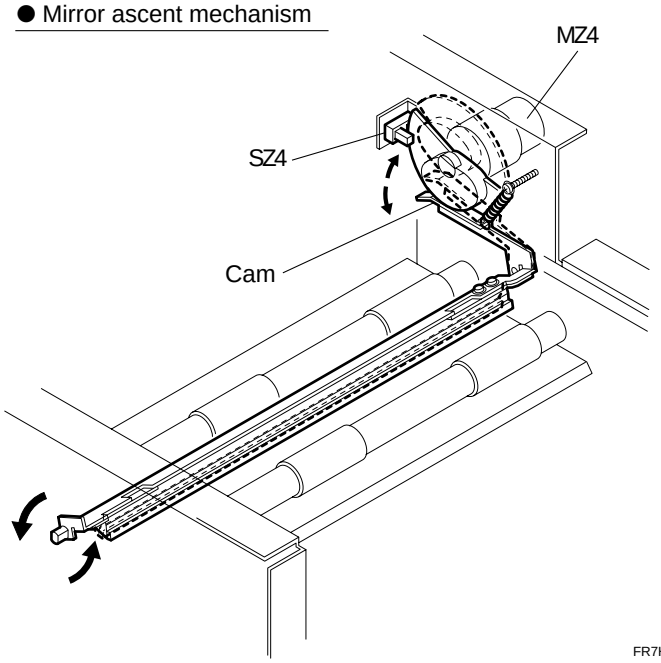
8.5.3 Mirror ascent

<Figure 1 Mirror ascent flowchart>



● Mirror ascent mechanism



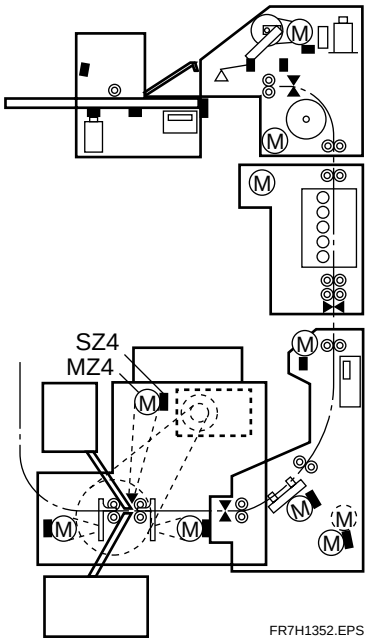
FR7H1276.EPS

Table 8.5.3.1 Operation Parameter

Symbol	Description	Value
TZ40	Mirror ascent timeout	1 sec

TR7H1176.EPS

<I/O arrangement diagram>



FR7H1352.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
MZ4	Mirror driving motor	DC motor	Moves the mirror up and down.
SZ4	Mirror HP sensor	PI (5 mm)	Detects the mirror HP.

TR7H1116.EPS

<Sensor ON/OFF status>

SZ4

OFF: Open (not blocked) ON: Closed (blocked)

FR7H1322.EPS

8.5.4 Initialization subscanning grip confirmation

<Figure 1 Initialization subscanning grip confirmation flowchart>

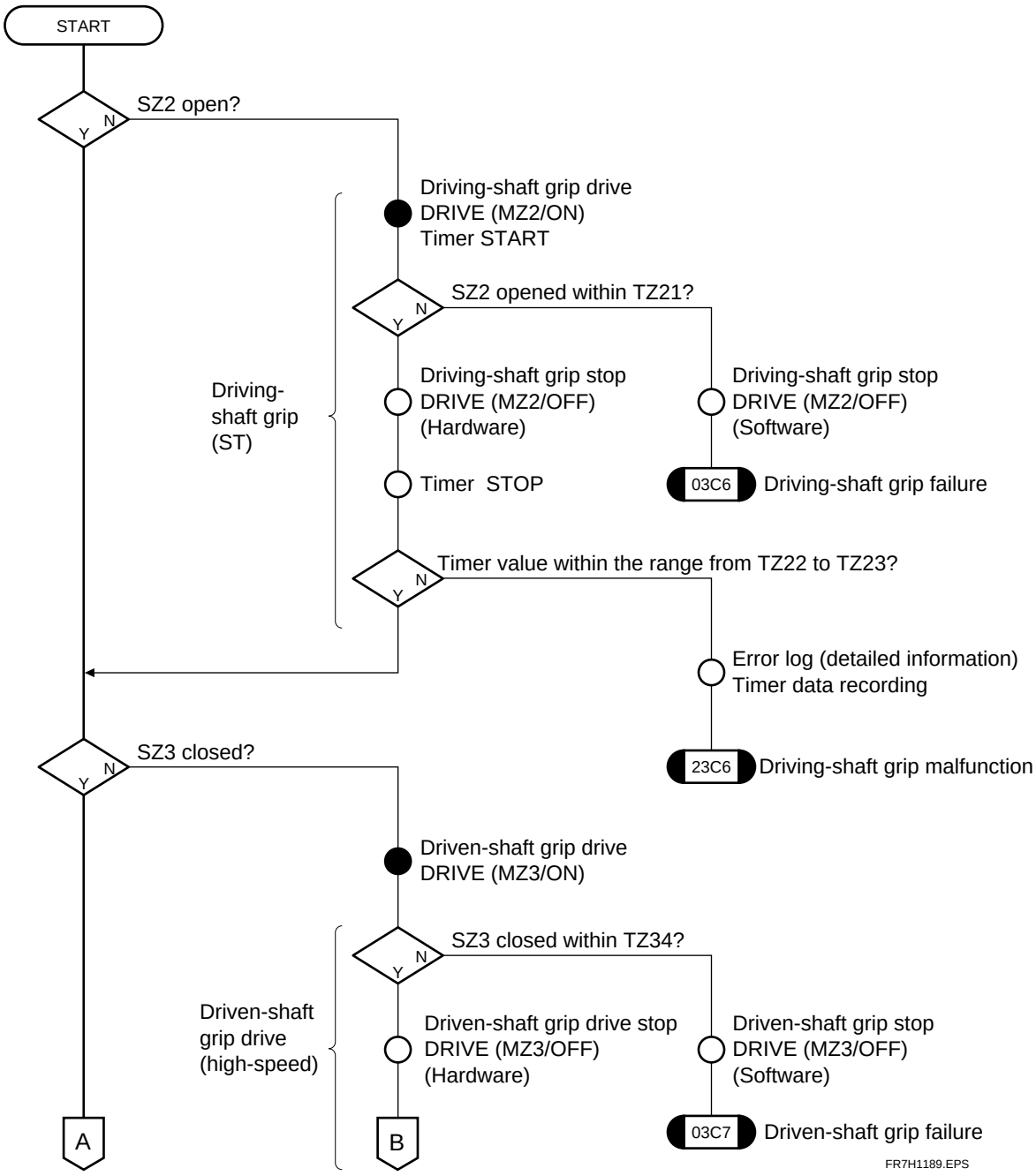


Table 8.5.4.1 Operation Parameter

Symbol	Description	Value
TZ51	Wait for initialization grip operation	0.5 sec

TR7H1177.EPS

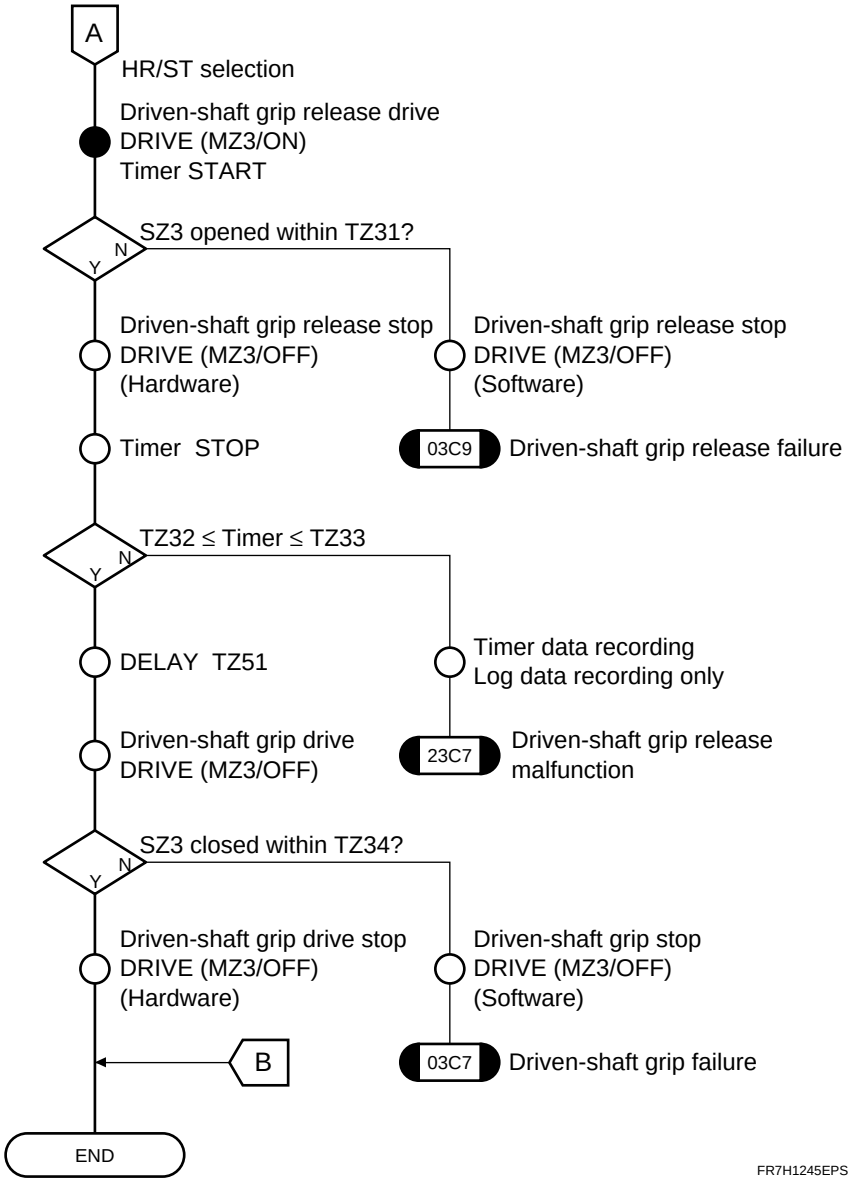
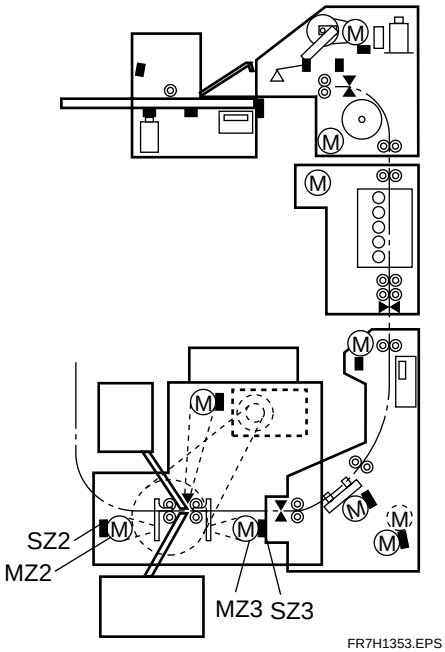


Table 8.5.4.2 Operation Parameters

Symbol	Description	Mode	Value
TZ21	Driving-shaft grip timeout	ST	7.6
		HR	15.3
TZ22	Driving-shaft grip specified lower limit	ST	2.7
		HR	5.3
TZ23	Driving-shaft grip specified upper limit	ST	5.0
		HR	9.9
TZ31	Driven-shaft grip release timeout	ST	6.2
		HR	12.4
TZ32	Driven-shaft grip release specified lower limit	ST	2.2
		HR	4.3
TZ33	Driven-shaft grip release specified upper limit	ST	4.0
		HR	8.1
TZ34	Driven-shaft grip timeout	ST	1.9
		HR	7.0

Unit: sec TR7H1226.EPS

<I/O arrangement diagram>



FR7H1353.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
MZ2	Driving-shaft grip motor	DC motor	Grips/releases the driving shaft.
MZ3	Driven-shaft grip motor	DC motor	Grips/releases the driven shaft.
SZ2	Driving-side grip release HP sensor	PI (5 mm)	Detects the driving-side grip release HP.
SZ3	Driven-side grip release HP sensor	PI (5 mm)	Detects the driven-side grip release HP.

TR7H1117.EPS

<Sensor ON/OFF status>

SZ2/SZ3

OFF: Open (not blocked)

ON: Closed (blocked)

FR7H1323.EPS

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8.5.5 Cleaning guide HP positioning

<Figure 1 Cleaning guide HP positioning flowchart>

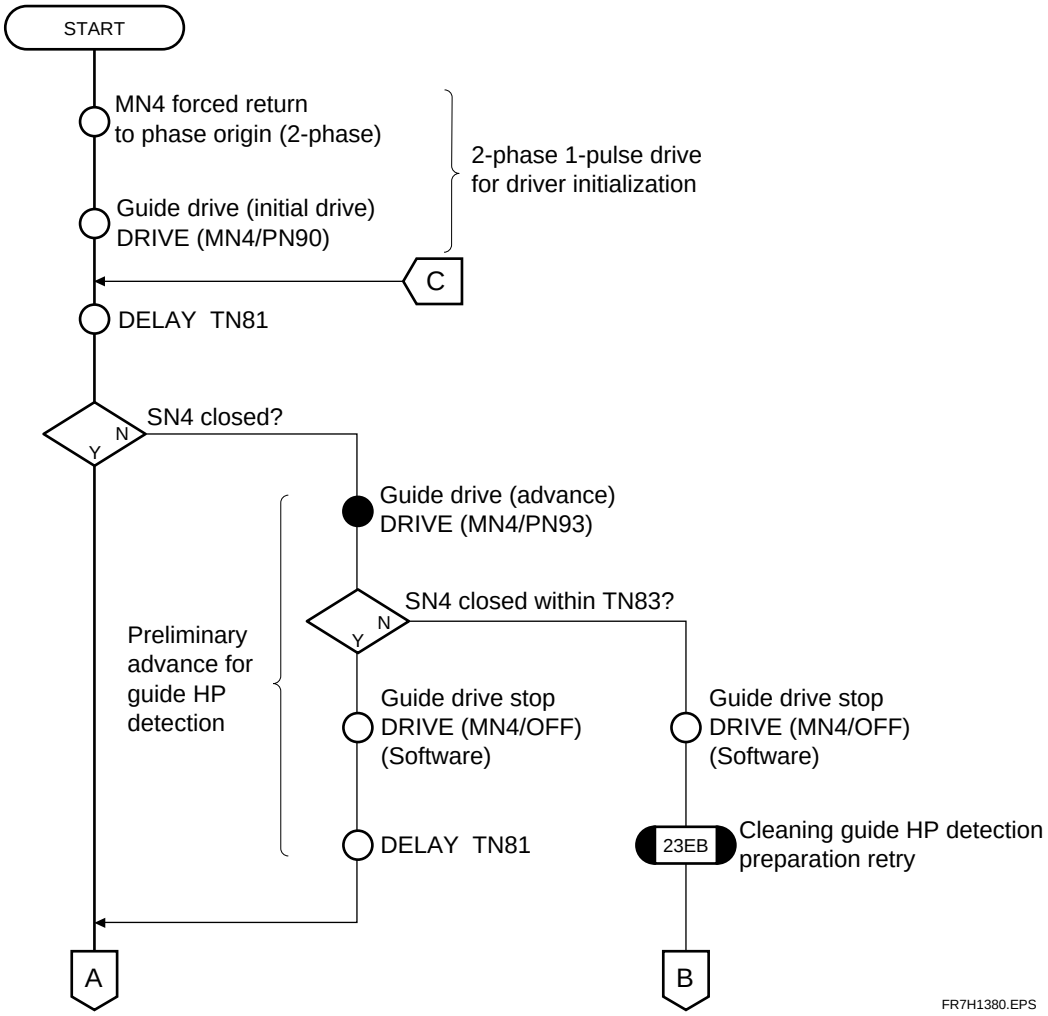
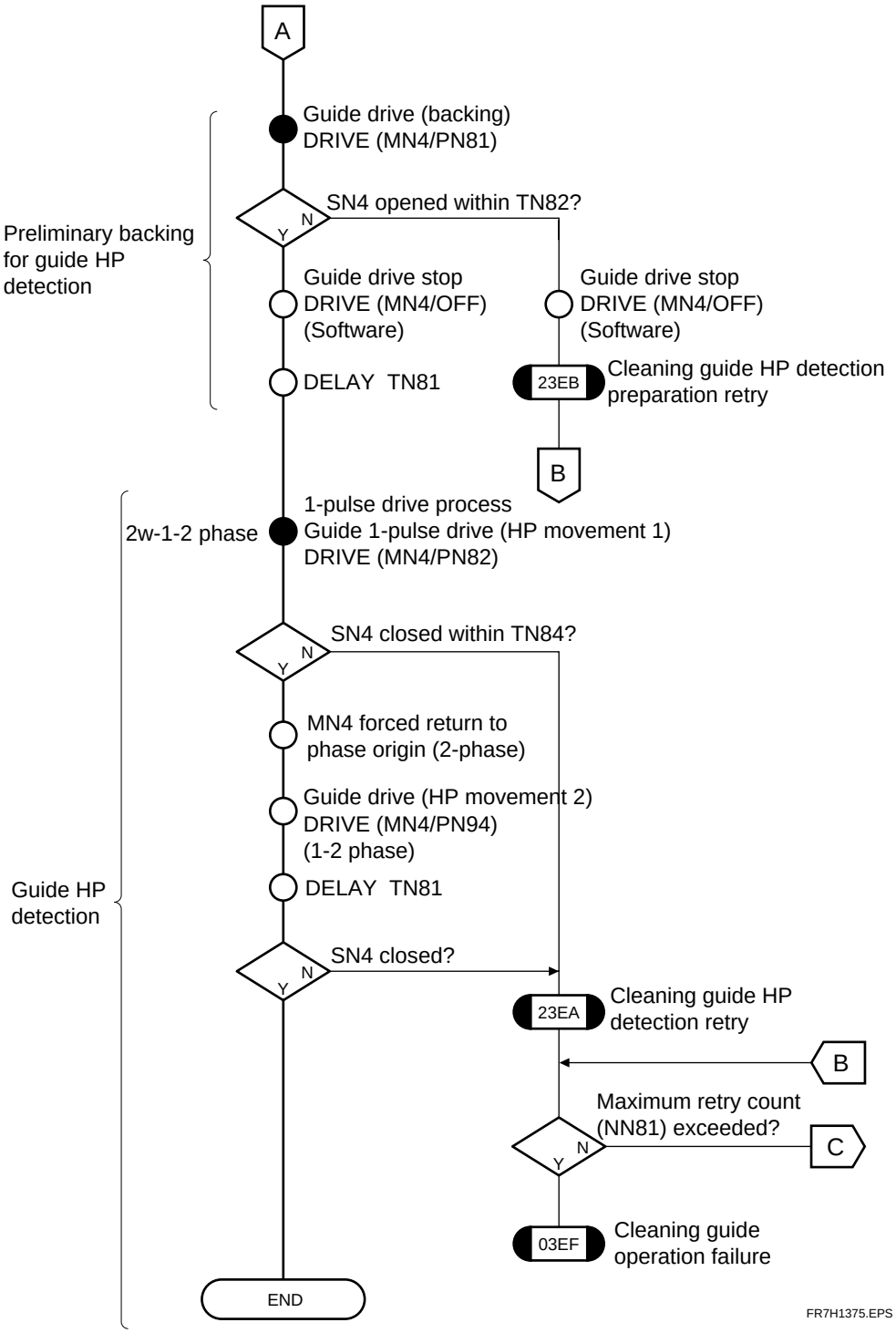


Table 8.5.5.1 Operation Parameters

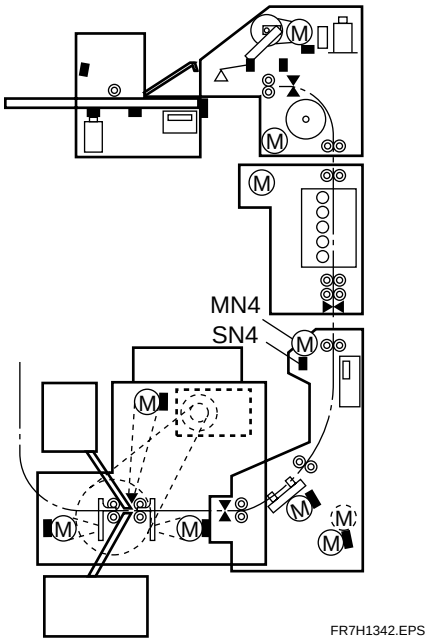
Symbol	Description	Value
NN81	Cleaning guide HP retry	3 times
PN81	Cleaning guide drive (backing to HP)	0xFFFFFF
PN82	Cleaning guide drive (pulse drive for HP movement)	CW 1 P
PN93	Conveyance (erasure 1)	0x7FFFFF
PN94	Before-erasure conveyance 2	CW 348 P
TN81	Wait for cleaning guide halt in HP	0.5 sec
TN82	Cleaning guide HP detection preparation timeout	0.6 sec
TN83	Cleaning guide HP detection timeout	1.6 sec
TN84	Cleaning guide HP 1-pulse drive timeout	13.3 sec

0x7FFFFF: Infinitely CW
0xFFFFFF: Infinitely CCW

TR7H1238.EPS


A
Guide drive (backing)
DRIVE (MN4/PN81)
SN4 opened within TN82?
N
Y
Preliminary backing for guide HP detection
Guide drive stop
DRIVE (MN4/OFF)
(Software)
Guide drive stop
DRIVE (MN4/OFF)
(Software)
DELAY TN81
23EB
Cleaning guide HP detection preparation retry
B
1-pulse drive process
2w-1-2 phase
Guide 1-pulse drive (HP movement 1)
DRIVE (MN4/PN82)
SN4 closed within TN84?
N
Y
MN4 forced return to phase origin (2-phase)
Guide drive (HP movement 2)
DRIVE (MN4/PN94)
(1-2 phase)
Guide HP detection
DELAY TN81
SN4 closed?
N
Y
23EA
Cleaning guide HP detection retry
B
Maximum retry count (NN81) exceeded?
N
Y
C
03EF
Cleaning guide operation failure
END
FR7H1375.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
MN4	Cleaning guide driving motor	Pulse motor	Grips/releases the cleaning guide.
SN4	Cleaning guide HP sensor	PI (5mm)	Detects the cleaning guide HP.

TR7H1107.EPS

<Sensor ON/OFF status>

SN4

OFF: Open (not blocked)

ON: Closed (blocked)

FR7H1312.EPS

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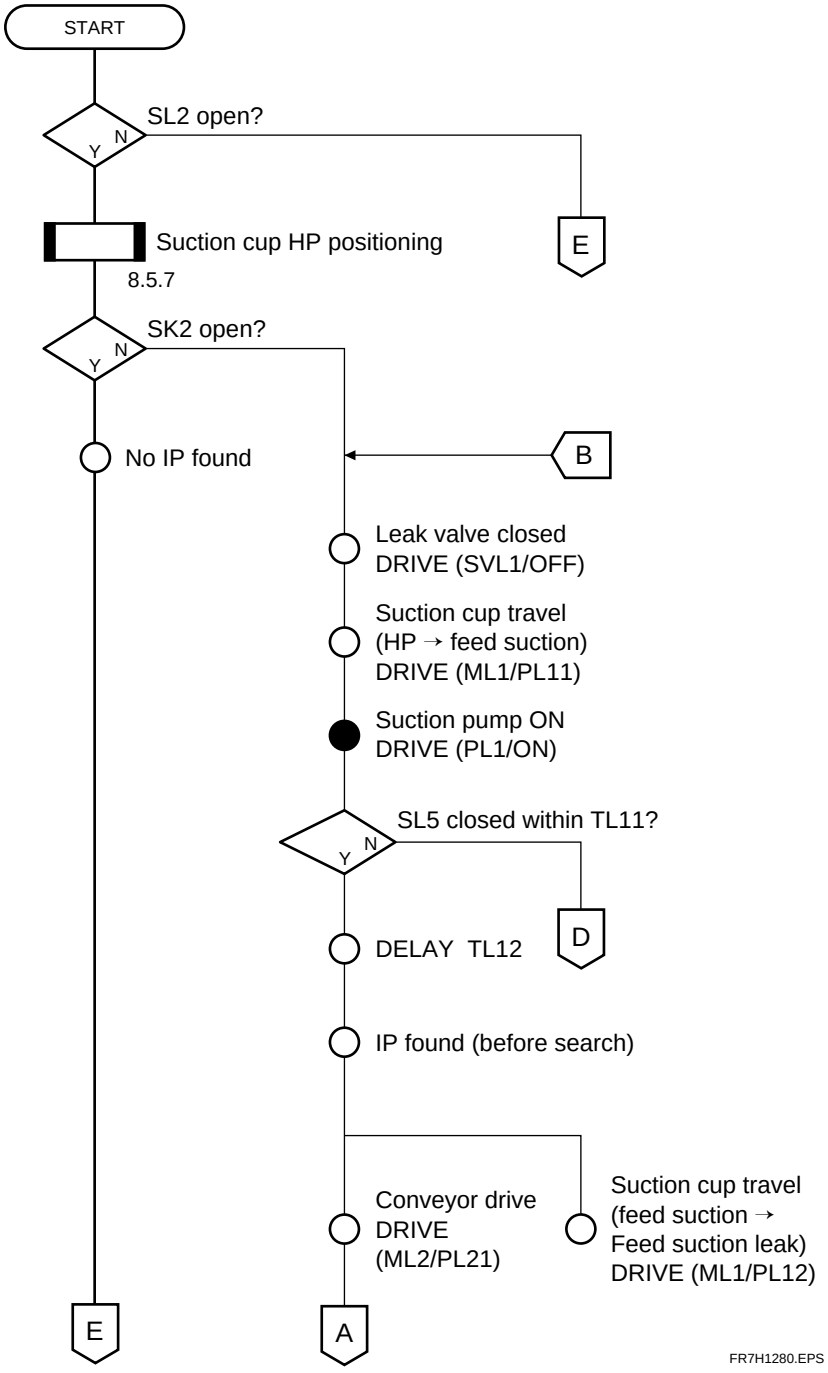
8.5.6 IP search

<Figure 1 IP search flowchart>



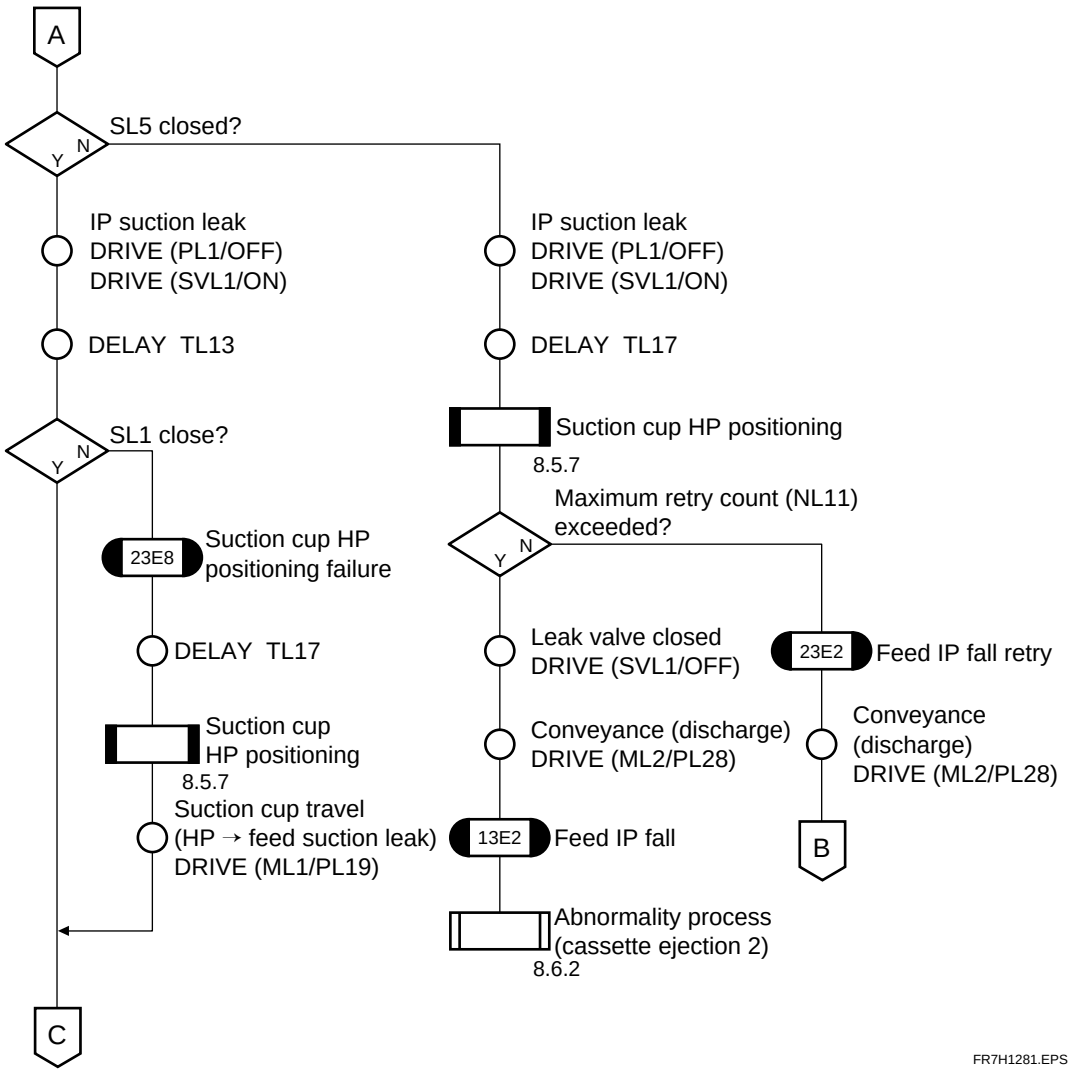


Table 8.5.6.1 Operation Parameters

Symbol	Description	Value
NL11	Feed suction retry	3 times
PL11	Suction cup travel (HP → feed suction)	CW 505 P
PL12	Suction cup travel (feed suction → feed suction leak)	CCW 530 P
PL19	Suction cup travel (HP → feed suction leak)	CCW 25 P
PL21	Conveyance (feed suction synchronization)	CCW 1350 P
PL28	Conveyance (discharge)	CW 5400 P
TL11	Feed suction timeout	1 sec
TL12	Wait for feed suction	0.05 sec
TL13	Wait for feed suction leak	0.1 sec
TL17	Wait for next operation	0.1 sec

TR7H1178.EPS

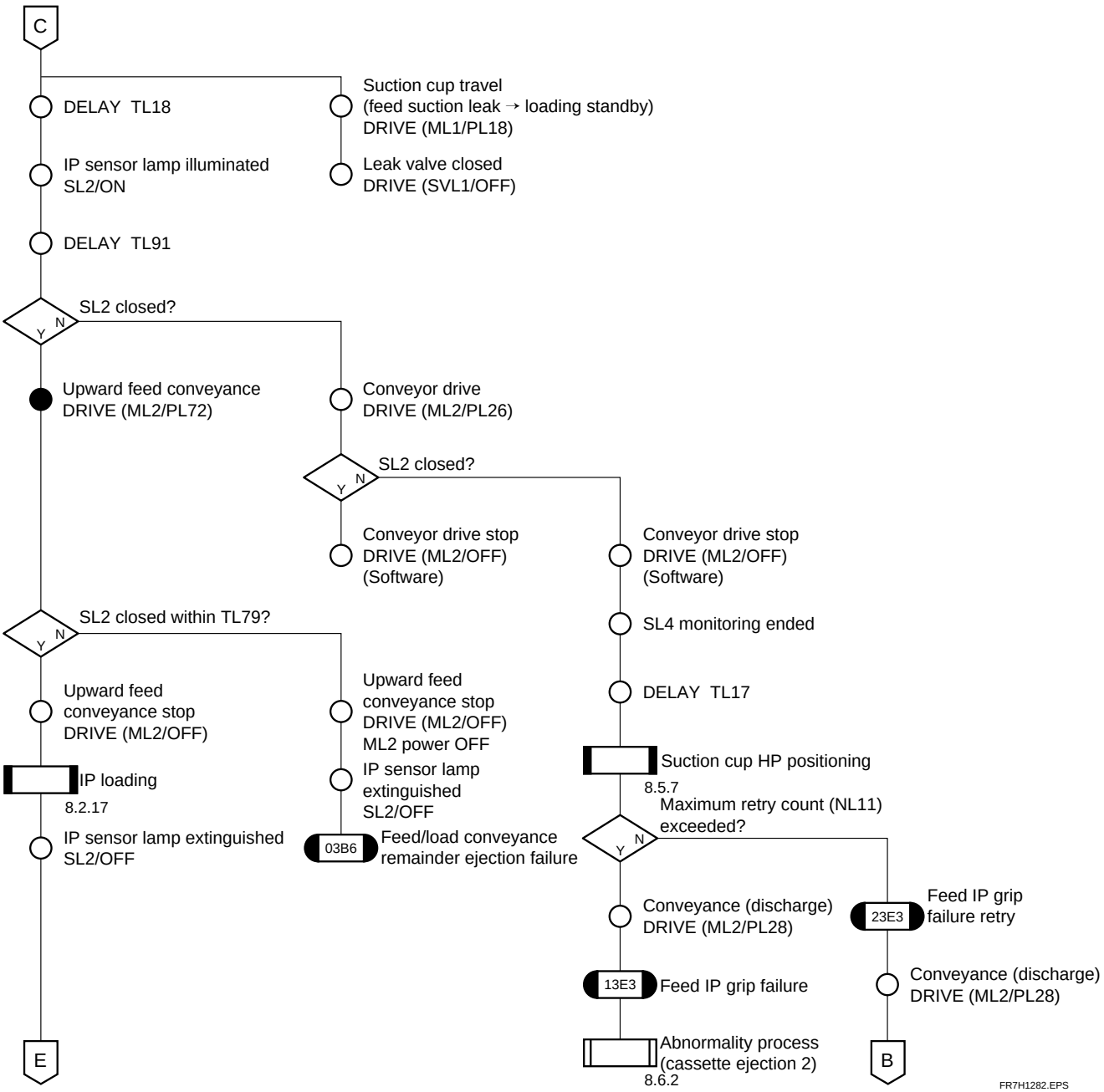


Table 8.5.6.2 Operation Parameter

Symbol	Description	Mode	Value
PL72	Initialization conveyance (upward)	ST	0x7FFFFF
		HR (nonstandard IPs included)	0x7FFFFF

0x7FFFFF: Infinitely CW
Unit: P

TR7H1227.EPS

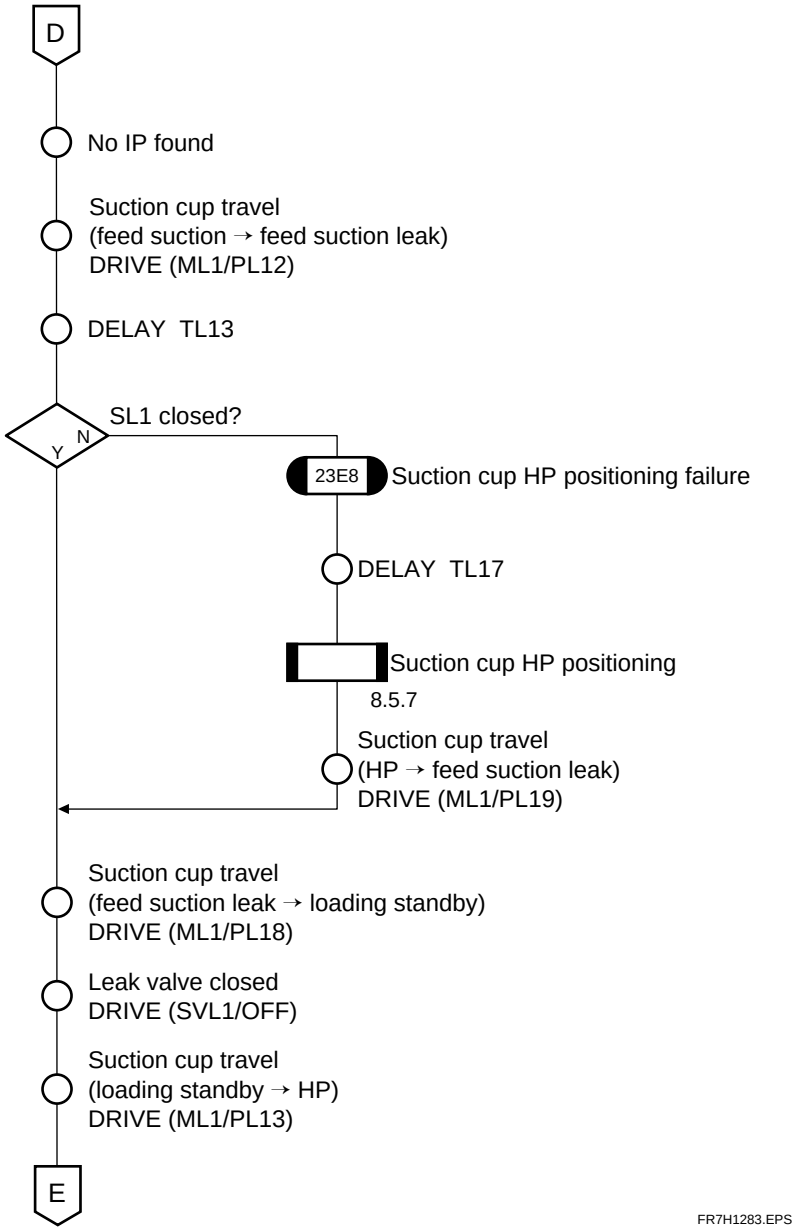


Table 8.5.6.3 Operation Parameters

Symbol	Description	Value
NL11	Feed suction retry	3 times
PL12	Suction cup travel (feed suction → feed suction leak)	CCW 530 P
PL13	Suction cup travel (loading standby → HP)	CW 135 P
PL18	Suction cup travel (feed suction leak → loading standby)	CCW 110 P
PL19	Suction cup travel (HP → feed suction leak)	CCW 25 P
PL26	Conveyance (grip retry)	0xFFFFFF
PL28	Conveyance (discharge)	CW 5400 P
TL13	Wait for feed suction leak	0.1 sec
TL17	Wait for next operation	0.1 sec
TL18	Wait for feed	0.05 sec
TL79	Feed/load conveyance remaining IP transfer timeout 2	10.7 sec
TL91	Wait for IP sensor stabilization	0.5 sec

0xFFFFFF: Infinitely CCW

TR7H1179.EPS

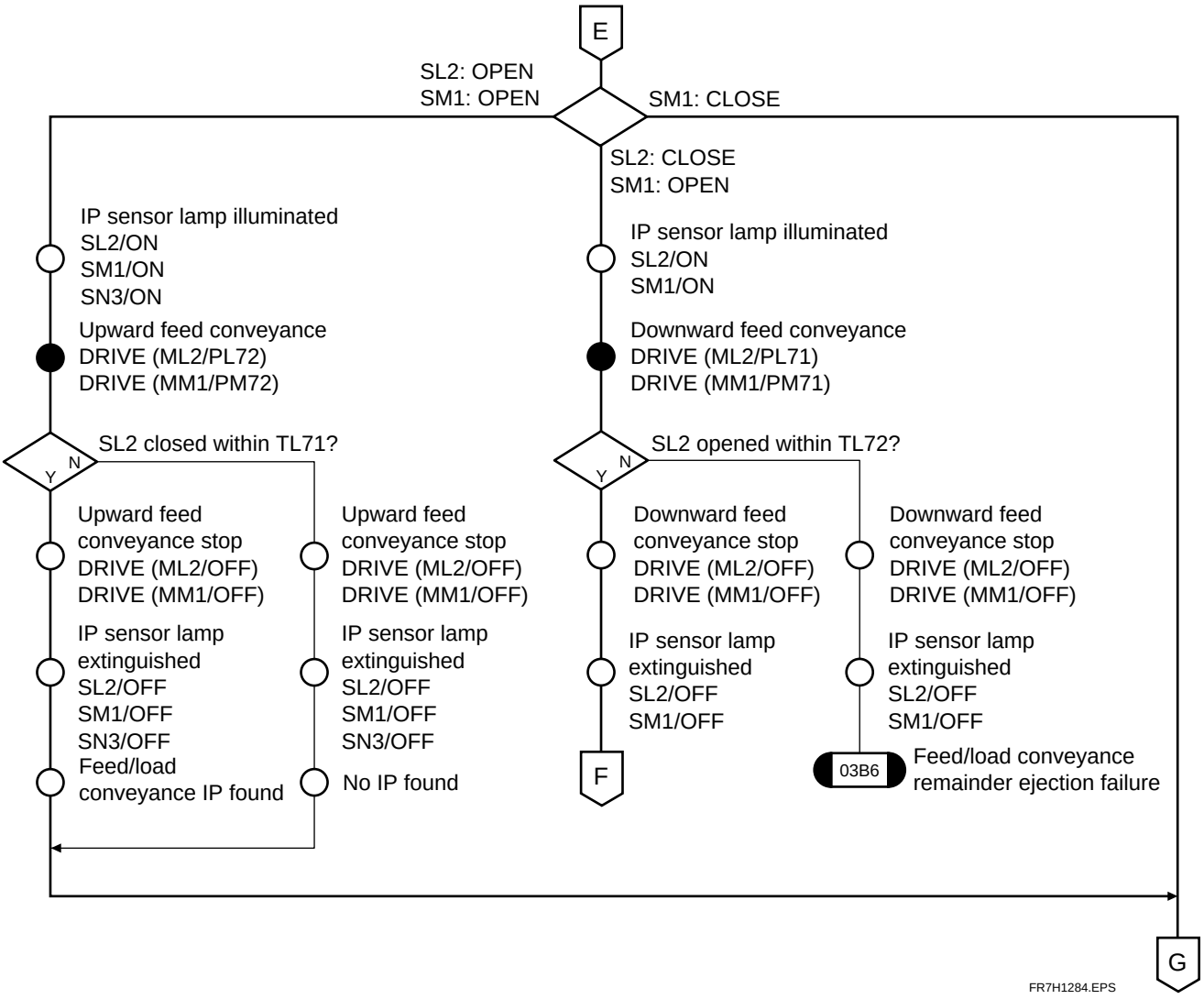


Table 8.5.6.4 Operation Parameters

Symbol	Description	Value
PL71	Initialization conveyance (downward)	0xFFFFFF
PM71	Initialization conveyance (downward)	0xFFFFFF
PM72	Initialization conveyance (upward)	0x7FFFFF
TL71	Feed/load conveyance remaining IP search timeout	11.2 sec
TL72	Feed/load conveyance remaining IP ejection timeout	7.6 sec
TL78	Feed/load conveyance remaining IP transfer timeout	8.7 sec

0x7FFFFF: Infinitely CW
0xFFFFFF: Infinitely CCW

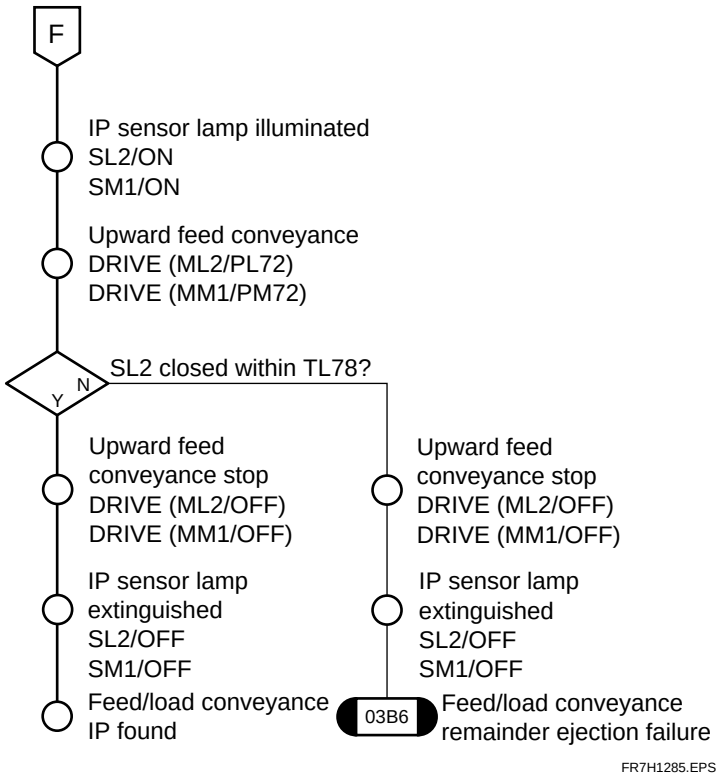
TR7H1180.EPS

Table 8.5.6.5 Operation Parameter

Symbol	Description	Mode	Value
PL72	Initialization conveyance (upward)	ST	0x7FFFFF
		HR (nonstandard IPs included)	0x7FFFFF

0x7FFFFF: Infinitely CW
Unit: P

TR7H1228.EPS


F
IP sensor lamp illuminated
SL2/ON
SM1/ON
Upward feed conveyance
DRIVE (ML2/PL72)
DRIVE (MM1/PM72)
SL2 closed within TL78?
Y
N
Upward feed conveyance stop
DRIVE (ML2/OFF)
DRIVE (MM1/OFF)
IP sensor lamp extinguished
SL2/OFF
SM1/OFF
Feed/load conveyance IP found
Upward feed conveyance stop
DRIVE (ML2/OFF)
DRIVE (MM1/OFF)
IP sensor lamp extinguished
SL2/OFF
SM1/OFF
03B6
Feed/load conveyance remainder ejection failure
FR7H1285.EPS

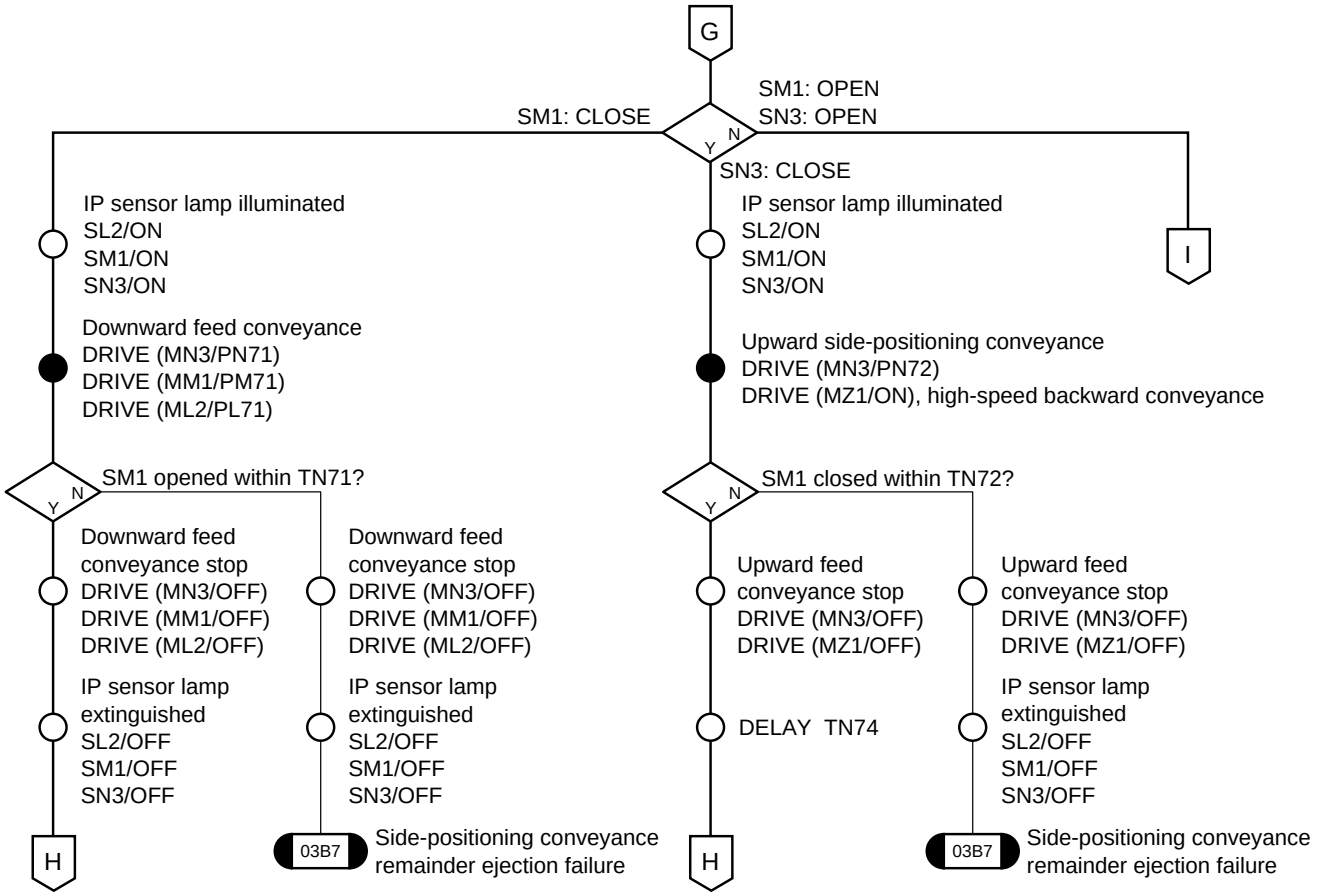
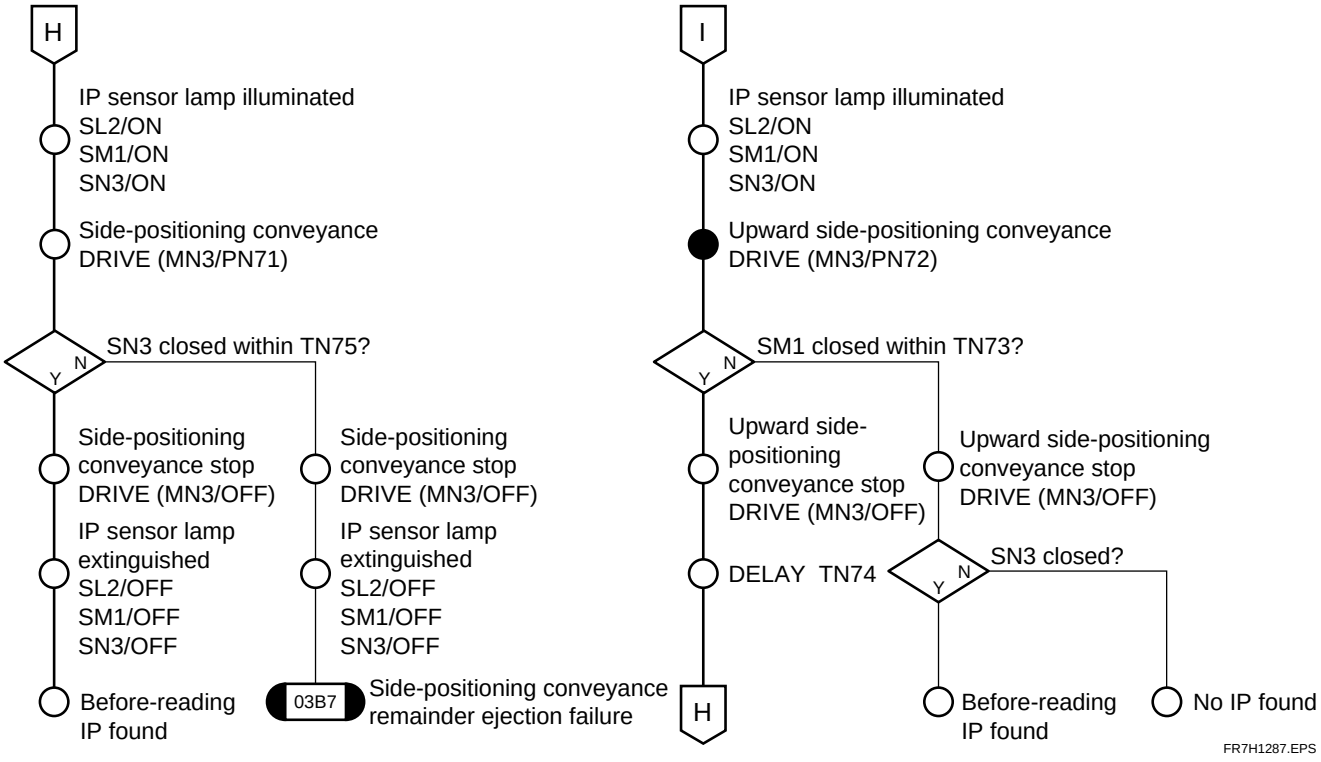


Table 8.5.6.6 Operation Parameters

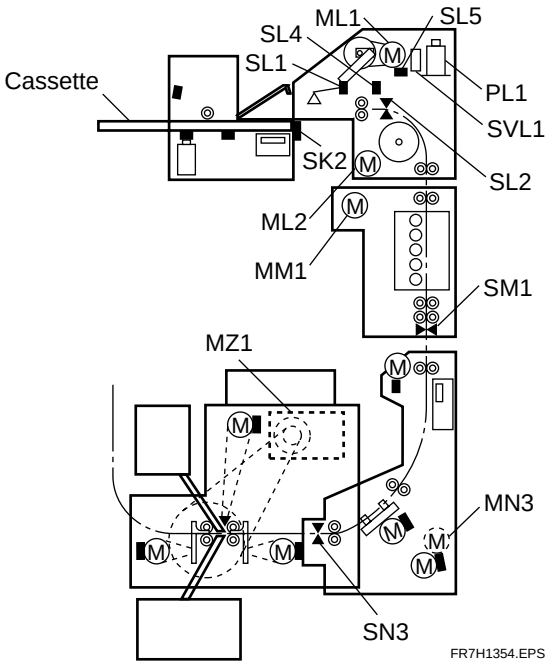
Symbol	Description	Value
PL71	Initialization conveyance (downward)	0xFFFFFF
PM71	Initialization conveyance (downward)	0xFFFFFF
PN71	Initialization conveyance (downward)	0xFFFFFF
PN72	Initialization conveyance (upward)	0x7FFFFF
TN71	Side-positioning conveyance remaining IP ejection timeout 1	7.6 sec
TN72	Side-positioning conveyance remaining IP ejection timeout 2	5.9 sec
TN73	Side-positioning conveyance remaining IP search timeout	5.8 sec
TN74	Wait for side-positioning switchback operation	0.5 sec
TN75	Initialization side-positioning unit positioning timeout	5.8 sec

0x7FFFFF: Infinitely CW
0xFFFFFF: Infinitely CCW

TR7H1181.EPS


H
IP sensor lamp illuminated
SL2/ON
SM1/ON
SN3/ON
Side-positioning conveyance
DRIVE (MN3/PN71)
SN3 closed within TN75?
Y
N
Side-positioning
conveyance stop
DRIVE (MN3/OFF)
IP sensor lamp
extinguished
SL2/OFF
SM1/OFF
SN3/OFF
Before-reading
IP found
Side-positioning
conveyance stop
DRIVE (MN3/OFF)
IP sensor lamp
extinguished
SL2/OFF
SM1/OFF
SN3/OFF
03B7
Side-positioning conveyance
remainder ejection failure
I
IP sensor lamp illuminated
SL2/ON
SM1/ON
SN3/ON
Upward side-positioning conveyance
DRIVE (MN3/PN72)
SM1 closed within TN73?
Y
N
Upward side-
positioning
conveyance stop
DRIVE (MN3/OFF)
DELAY TN74
Upward side-positioning
conveyance stop
DRIVE (MN3/OFF)
SN3 closed?
Y
N
Before-reading
IP found
No IP found
H
FR7H1287.EPS

<I/O arrangement diagram>



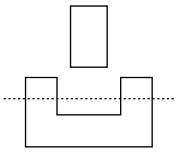
<I/O list>

Symbol	Name	Type	Function/remarks
ML1	Suction cup driving motor	Pulse motor	Opens the cassette rear cover and moves a roller.
ML2	IP conveyance motor	Pulse motor	Conveys the IP.
MM1	IP conveyance motor	Pulse motor	Conveys the IP.
MN3	IP conveyance motor	Pulse motor	Conveys the IP.
MZ1	Subscanning motor	FFM9	Conveys the IP.
PL1	IP suction pump	DC pump	When turned ON, this pump produces a vacuum.
SK2	Cassette IN sensor	Microswitch	The state of this sensor is ANDed with that of the SK3 to achieve recognition.
SL1	Suction cup HP sensor	PI (5 mm)	Detects the IP removal arm HP.
SL2	Cassette opening IP sensor	PI (19 mm)	IP transport sensor.
SL4	Inch/metric sensor	Reflection type	Determines the IP width.
SL5	Suction sensor	Suction sensor	IP suction sensor.
SM1	Before-BCR IP sensor	PI (19 mm)	IP transport sensor.
SN3	Side-positioning IP sensor	PI (19 mm)	IP transport sensor.
SVL1	IP suction leak valve	Solenoid valve	When turned ON, this valve provides suction leak.

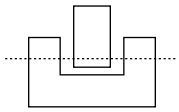
TR7H1118.EPS

<Sensor ON/OFF status>

SL1

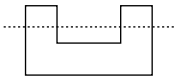


OFF: Open (not blocked)

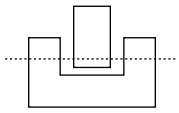


ON: Closed (blocked)

SL2/SM1/SN3

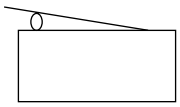


OFF: Open (IP not found)



ON: Closed (IP found)

SK2

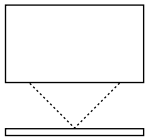


OFF: Open

ON: Closed

SL4

OFF (0): Open



ON (1): Closed

FR7H1324.EPS

8.5.7 Suction cup HP positioning

<Figure 1 Suction cup HP positioning flowchart>

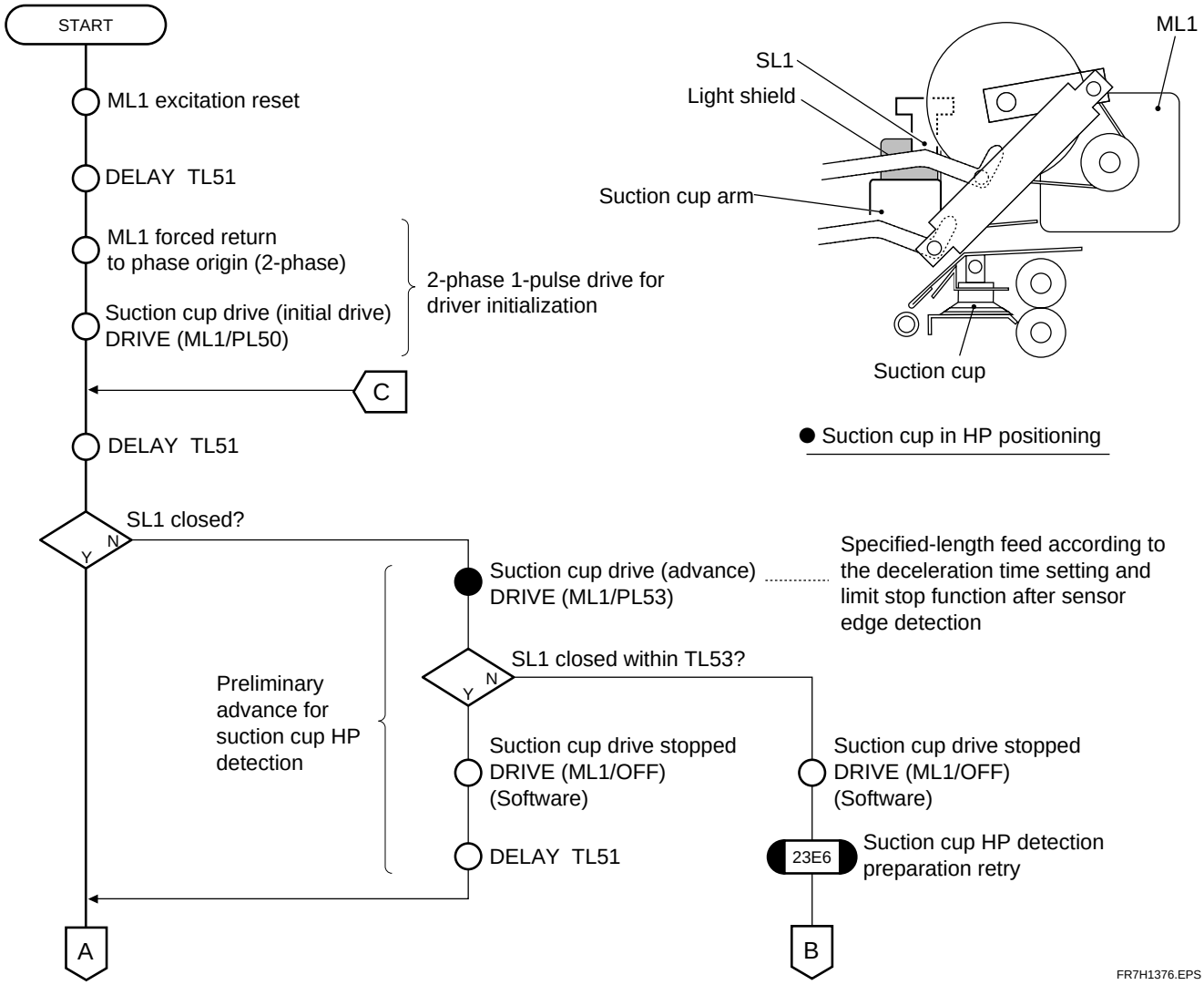
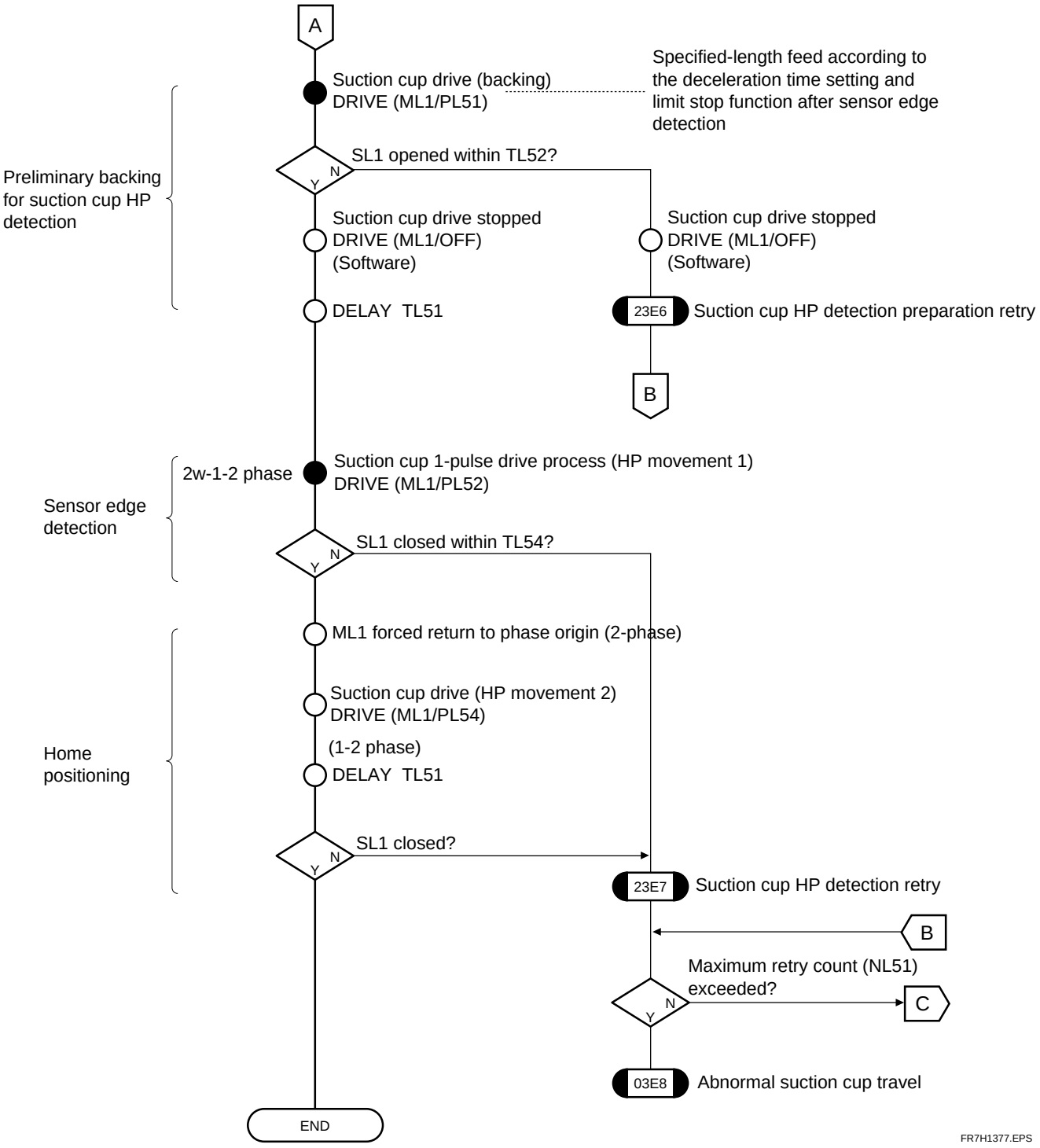


Table 8.5.7.1 Operation Parameters

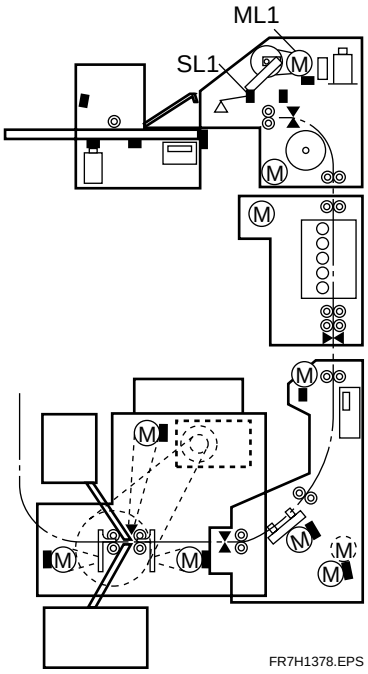
Symbol	Description	Value
NL51	Suction cup HP retry	2 times
PL50	Suction cup travel (initial drive)	CW 1 P
PL51	Suction cup travel (backing to HP)	0x7FFFFF
PL52	Suction cup 1-pulse drive (HP movement 1)	CCW 1 P
PL53	Suction cup travel (advance to HP)	0xFFFFFF
PL54	Suction cup travel (HP movement 2)	CCW 20 P
TL51	Wait for suction cup halt in HP	0.5 sec
TL52	Suction cup HP detection preparation timeout	1.3 sec
TL53	Suction cup HP detection timeout	5.3 sec
TL54	Suction cup HP 1-pulse drive timeout	20 sec

0x7FFFFF: Infinitely CW
0xFFFFFF: Infinitely CCW

TR7H1239.EPS


A
Suction cup drive (backing)
DRIVE (ML1/PL51)
Specified-length feed according to the deceleration time setting and limit stop function after sensor edge detection
Preliminary backing for suction cup HP detection
SL1 opened within TL52?
N
Y
Suction cup drive stopped
DRIVE (ML1/OFF)
(Software)
Suction cup drive stopped
DRIVE (ML1/OFF)
(Software)
DELAY TL51
23E6
Suction cup HP detection preparation retry
B
2w-1-2 phase
Suction cup 1-pulse drive process (HP movement 1)
DRIVE (ML1/PL52)
Sensor edge detection
SL1 closed within TL54?
N
Y
ML1 forced return to phase origin (2-phase)
Suction cup drive (HP movement 2)
DRIVE (ML1/PL54)
(1-2 phase)
Home positioning
DELAY TL51
SL1 closed?
N
Y
23E7
Suction cup HP detection retry
B
Maximum retry count (NL51) exceeded?
N
Y
C
03E8
Abnormal suction cup travel
END
FR7H1377.EPS

<I/O arrangement diagram>



FR7H1378.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
ML1	Suction cup driving motor	Pulse motor	Opens the cassette rear cover and moves a roller.
SL1	Suction cup HP sensor	PI (5 mm)	Detects the IP removal arm HP.

TR7H1240.EPS

<Sensor ON/OFF status>

SL1

OFF: Open (not blocked)

ON: Closed (blocked)

FR7H1379.EPS

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8.5.8 Feed/load conveyance IP processing

<Figure 1 Feed/load conveyance IP processing flowchart>

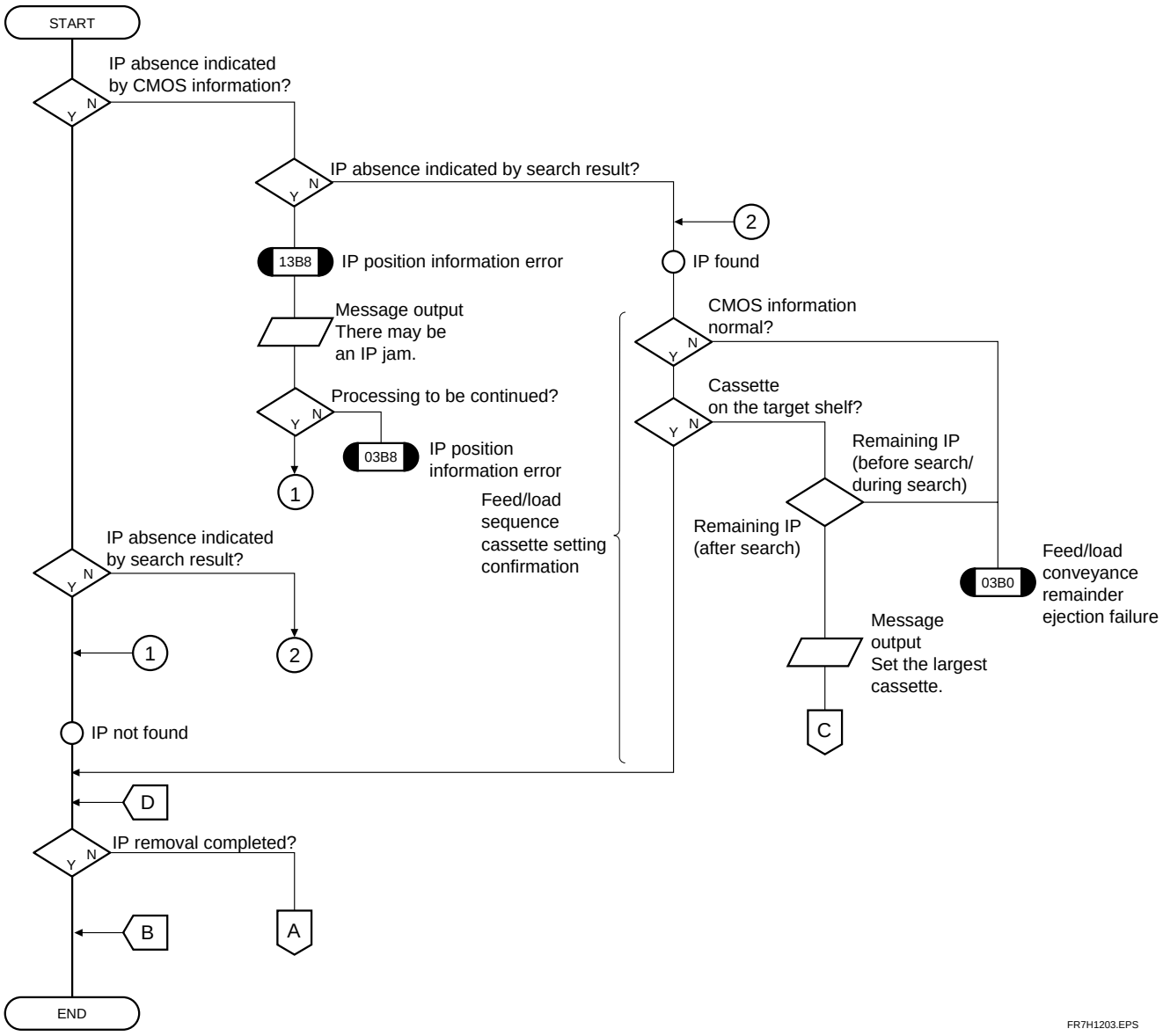


Table 8.5.8.1 Operation Parameters

Symbol	Description	Value
PM72	Initialization conveyance (upward)	0x7FFFFF
PN72	Initialization conveyance (upward)	0x7FFFFF
TL72	Feed/load conveyance remaining IP ejection timeout	7.6 sec

0x7FFFFF: Infinitely CW

TR7H1183.EPS

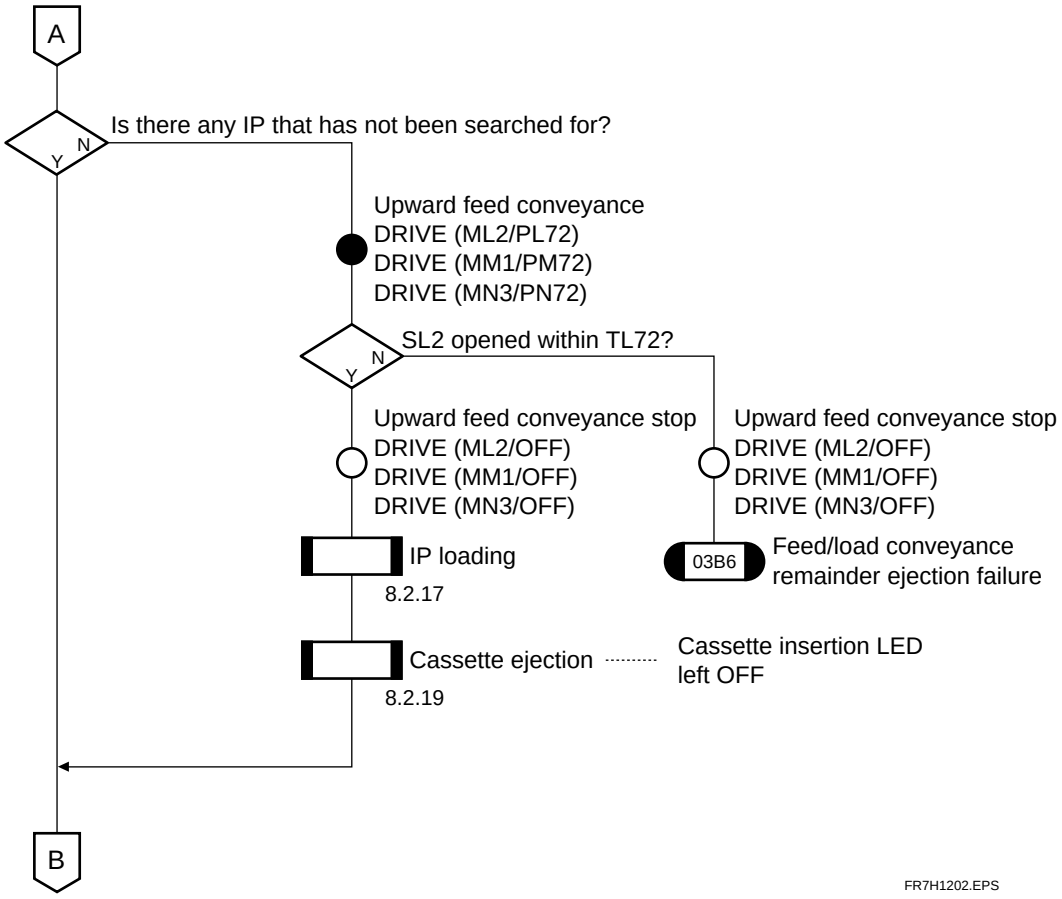


Table 8.5.8.2 Operation Parameter

Symbol	Description	Mode	Value
PL72	Initialization conveyance (upward)	ST	0x7FFFFF
		HR (nonstandard IPs included)	0x7FFFFF

0x7FFFFF: Infinitely CW
Unit: P

TR7H1229.EPS

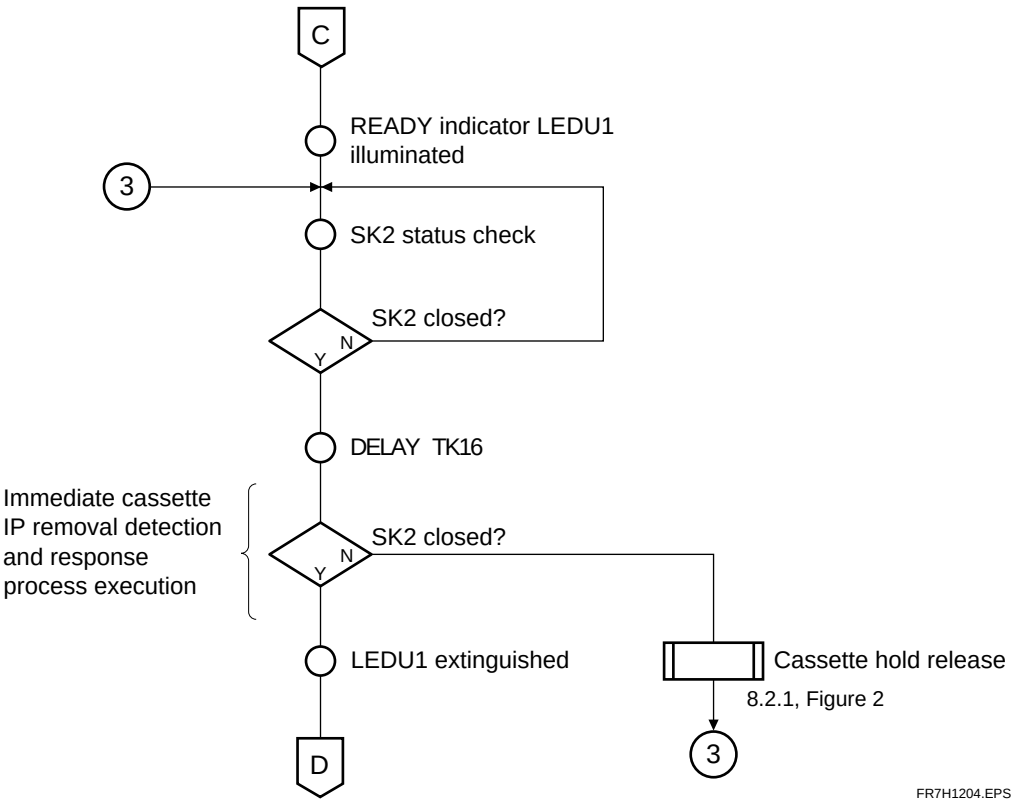
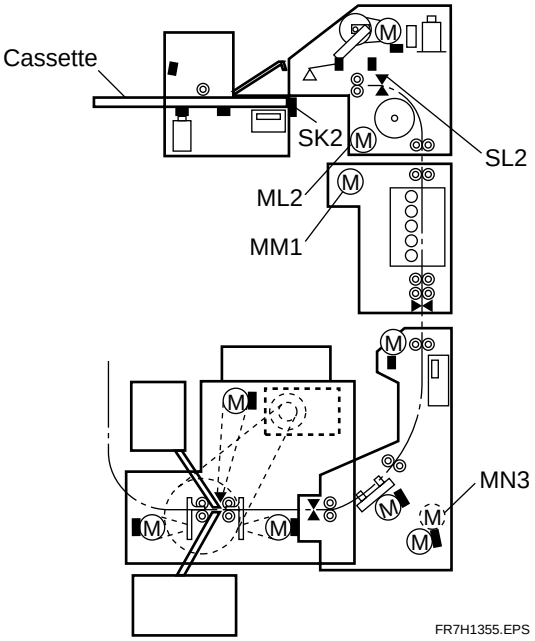


Table 8.5.8.3 Operation Parameter

Symbol	Description	Value
TK16	Wait for cassette insertion	0 sec

TR7H1184.EPS

<I/O arrangement diagram>

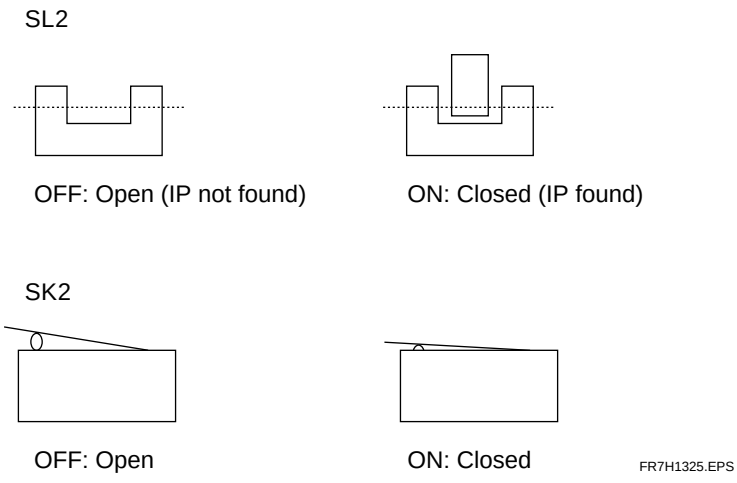


<I/O list>

Symbol	Name	Type	Function/remarks
ML2	IP conveyance motor	Pulse motor	Conveys the IP.
MM1	IP conveyance motor	Pulse motor	Conveys the IP.
MN3	IP conveyance motor	Pulse motor	Conveys the IP.
SK2	Cassette IN sensor	Microswitch	The state of this sensor is ANDed with that of the SK3 to achieve recognition.
SL2	Cassette opening IP sensor	PI (19 mm)	IP transport sensor.
LEDU1	Cassette insertion indicator	LED	Indicates that the machine is ready for cassette insertion.

TR7H1119.EPS

<Sensor ON/OFF status>



8.5.9 Cassette hold release confirmation

<Figure 1 Cassette hold release confirmation>

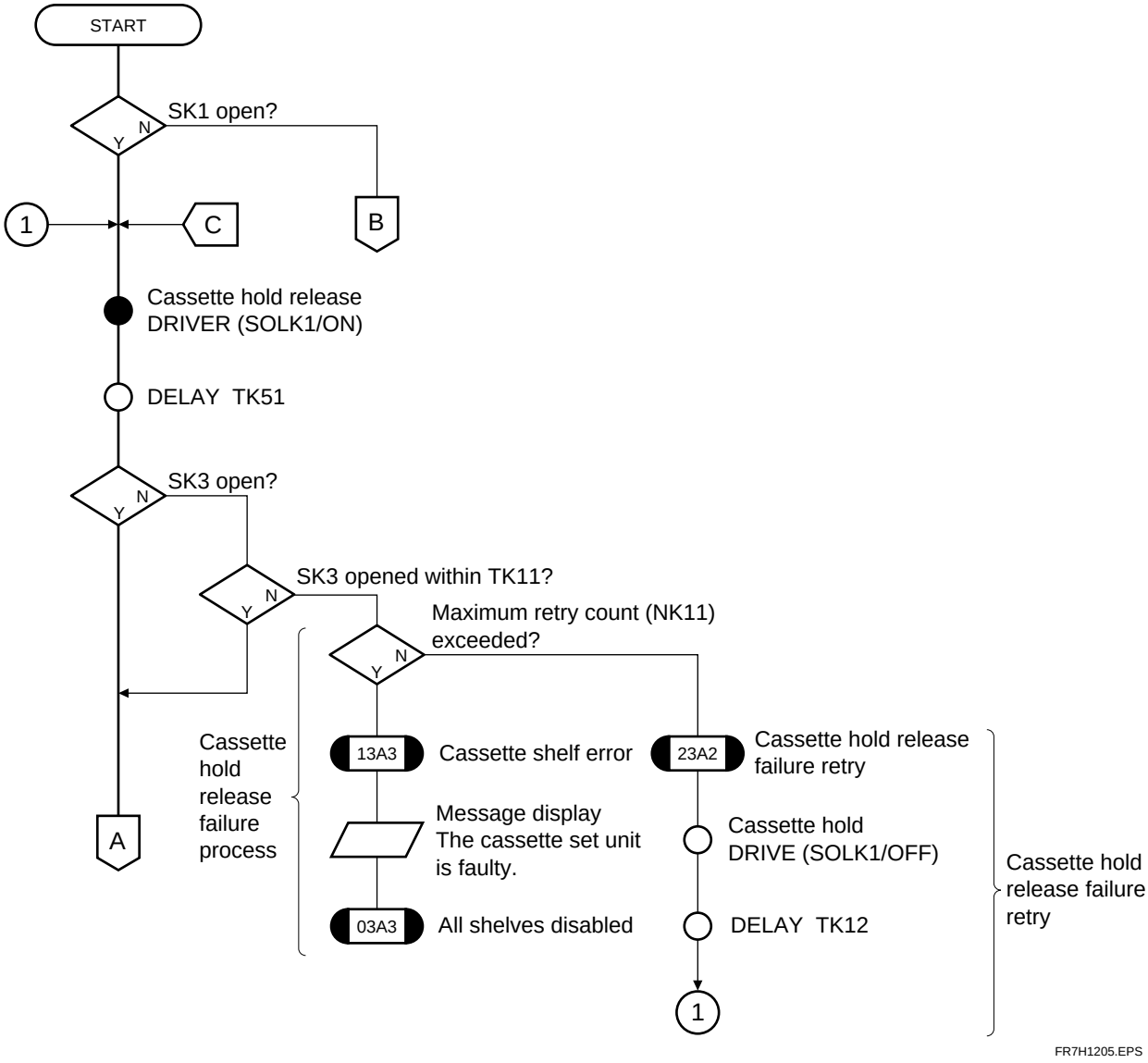
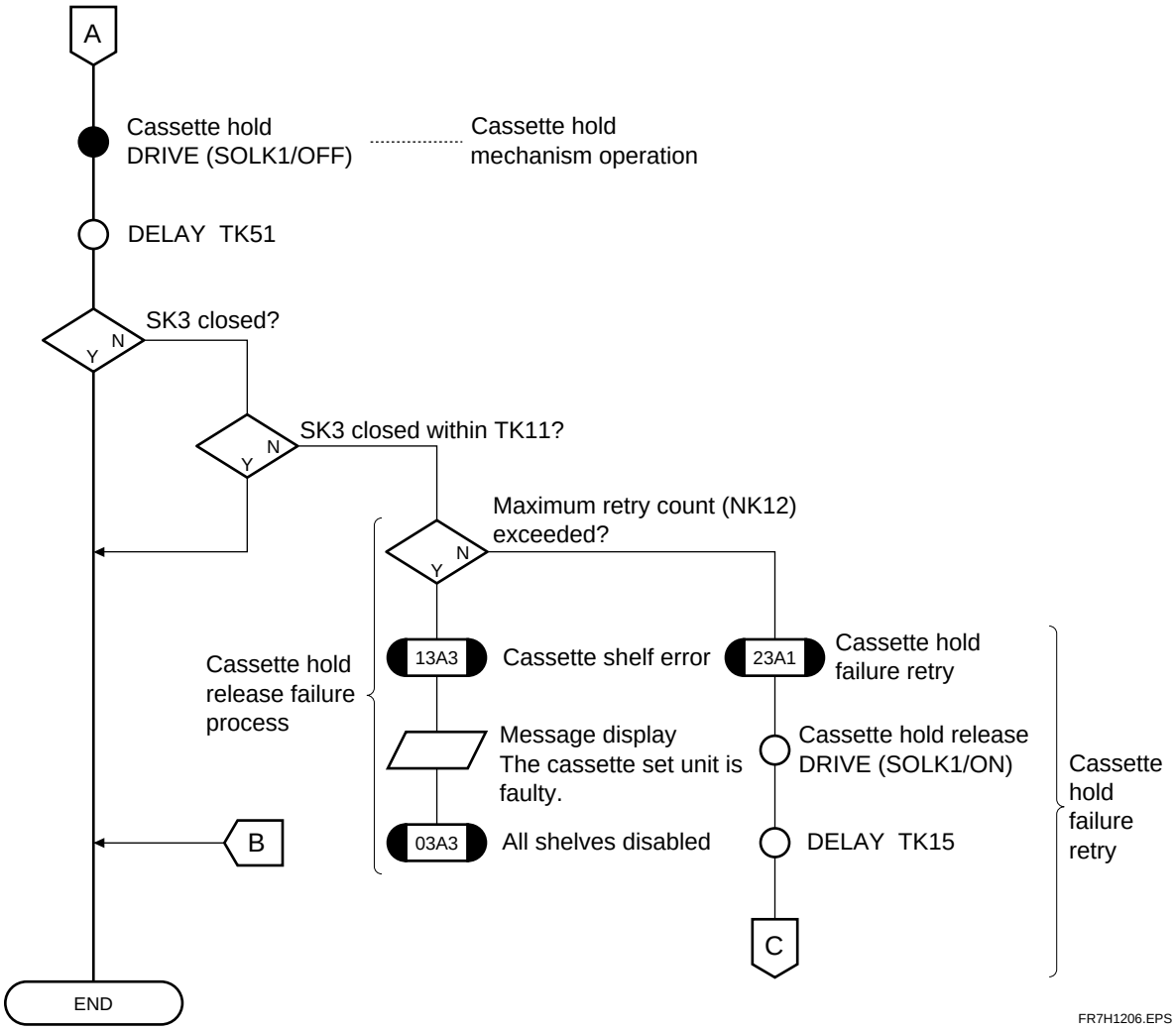


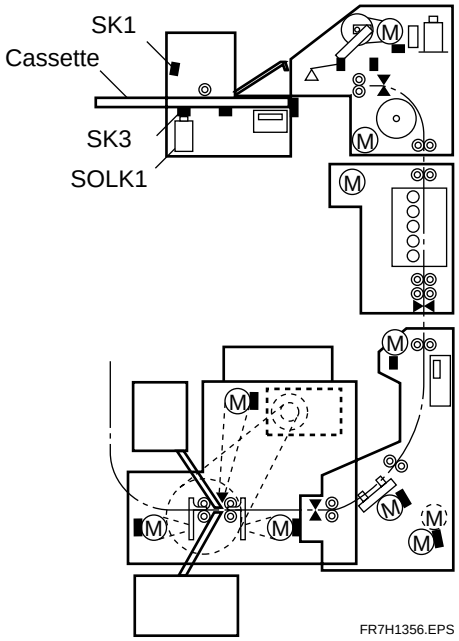
Table 8.5.9.1 Operation Parameters

Symbol	Description	Value
NK11	Hold release retry	5 times
NK12	Hold retry count	5 times
TK11	Hold release timeout	0.5 sec
TK12	Wait for hold release retry	2 sec
TK15	Wait for hold retry	2 sec
TK51	Wait for initialization hold	0.5 sec

TR7H1185.EPS


A
Cassette hold DRIVE (SOLK1/OFF)
Cassette hold mechanism operation
DELAY TK51
SK3 closed?
N
Y
SK3 closed within TK11?
N
Y
Maximum retry count (NK12) exceeded?
N
Y
Cassette hold release failure process
13A3
Cassette shelf error
Message display The cassette set unit is faulty.
03A3
All shelves disabled
B
23A1
Cassette hold failure retry
Cassette hold release DRIVE (SOLK1/ON)
DELAY TK15
C
Cassette hold failure retry
END
FR7H1206.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
SK1	Cassette ejection sensor	PI (5 mm)	Detects a cassette ejection.
SK3	Cassette hold sensor	PI (5 mm)	Actuates upon completion of a cassette hold operation.
SOLK1	Cassette hold solenoid	Power down solenoid	When turned ON, this solenoid retracts the cassette hold pin.

TR7H1120.EPS

<Sensor ON/OFF status>

SK1/SK3

OFF: Open (not blocked) ON: Closed (blocked) FR7H1326.EPS

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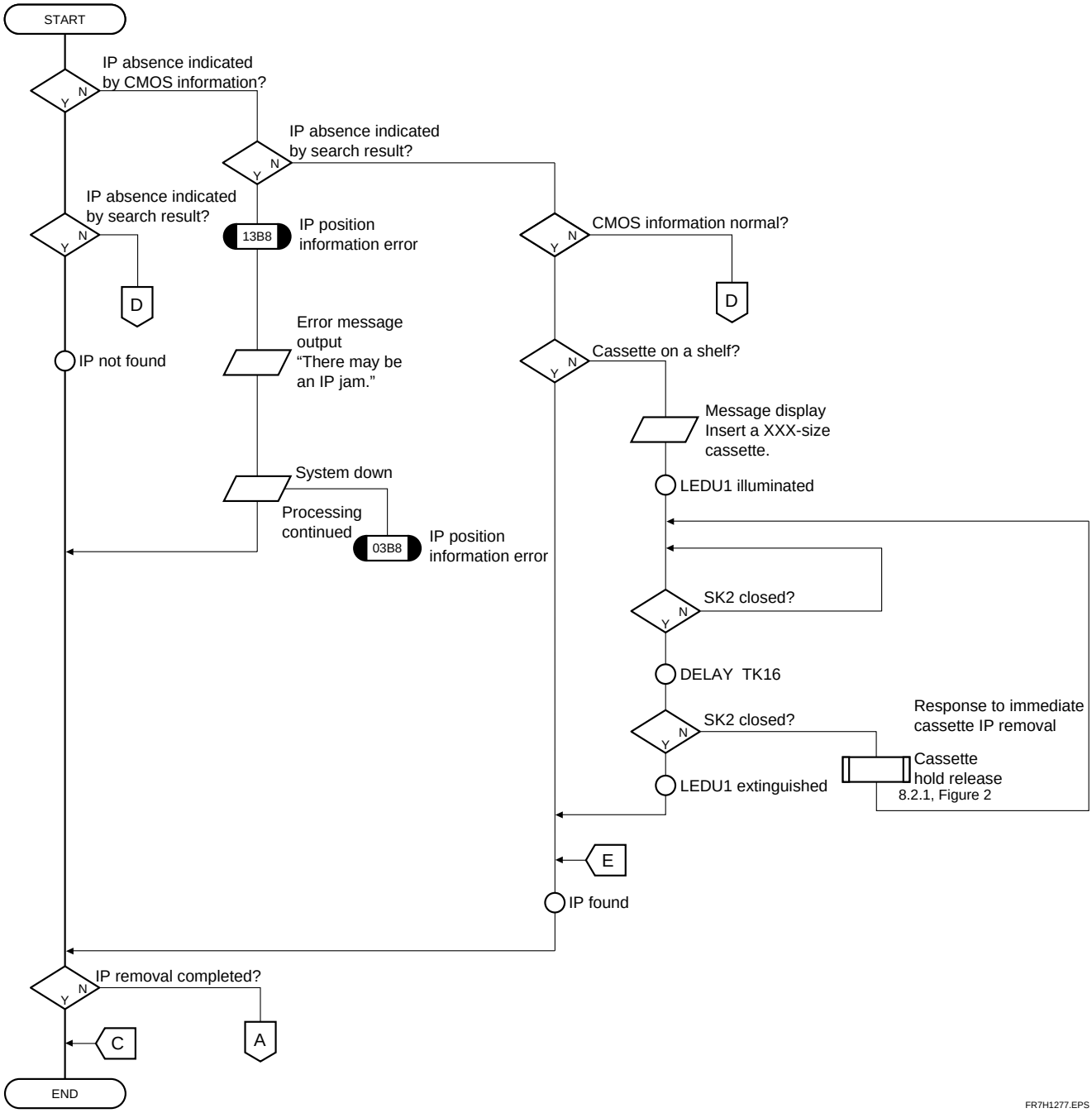
8.5.10 Before-reading standby IP processing

<Figure 1 Before-reading standby IP processing>



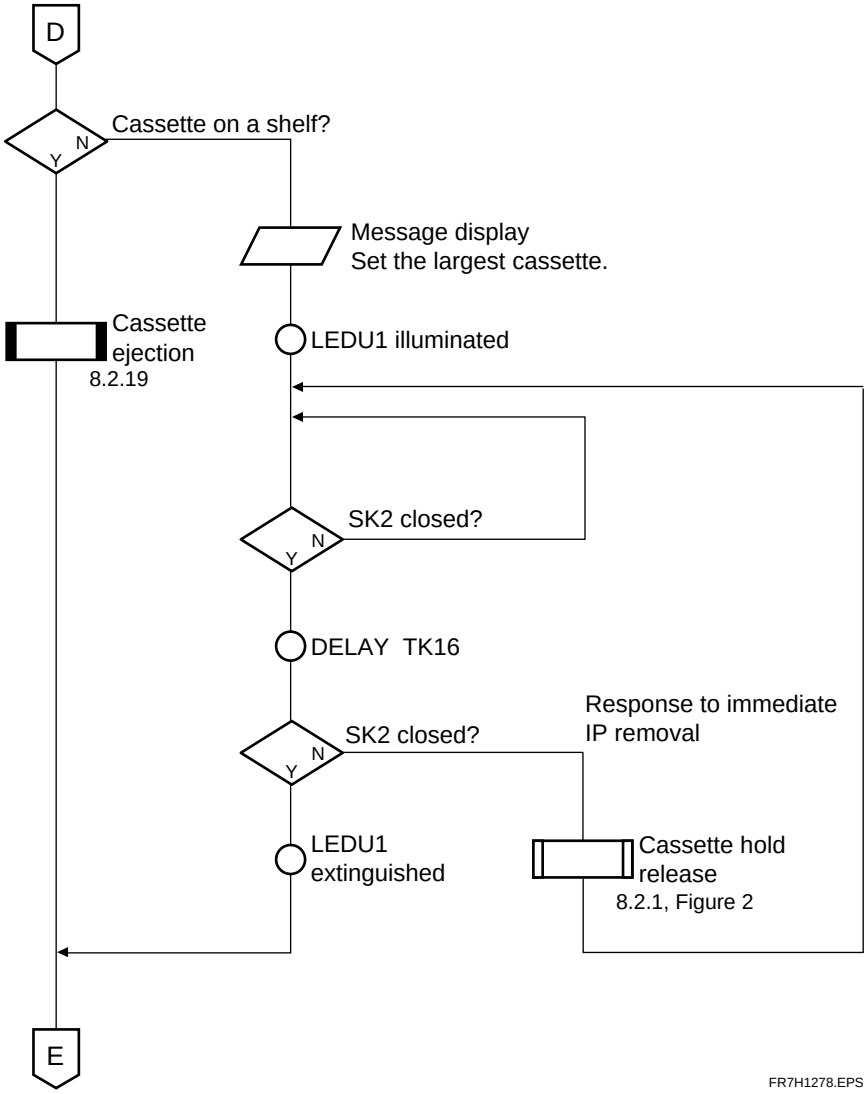
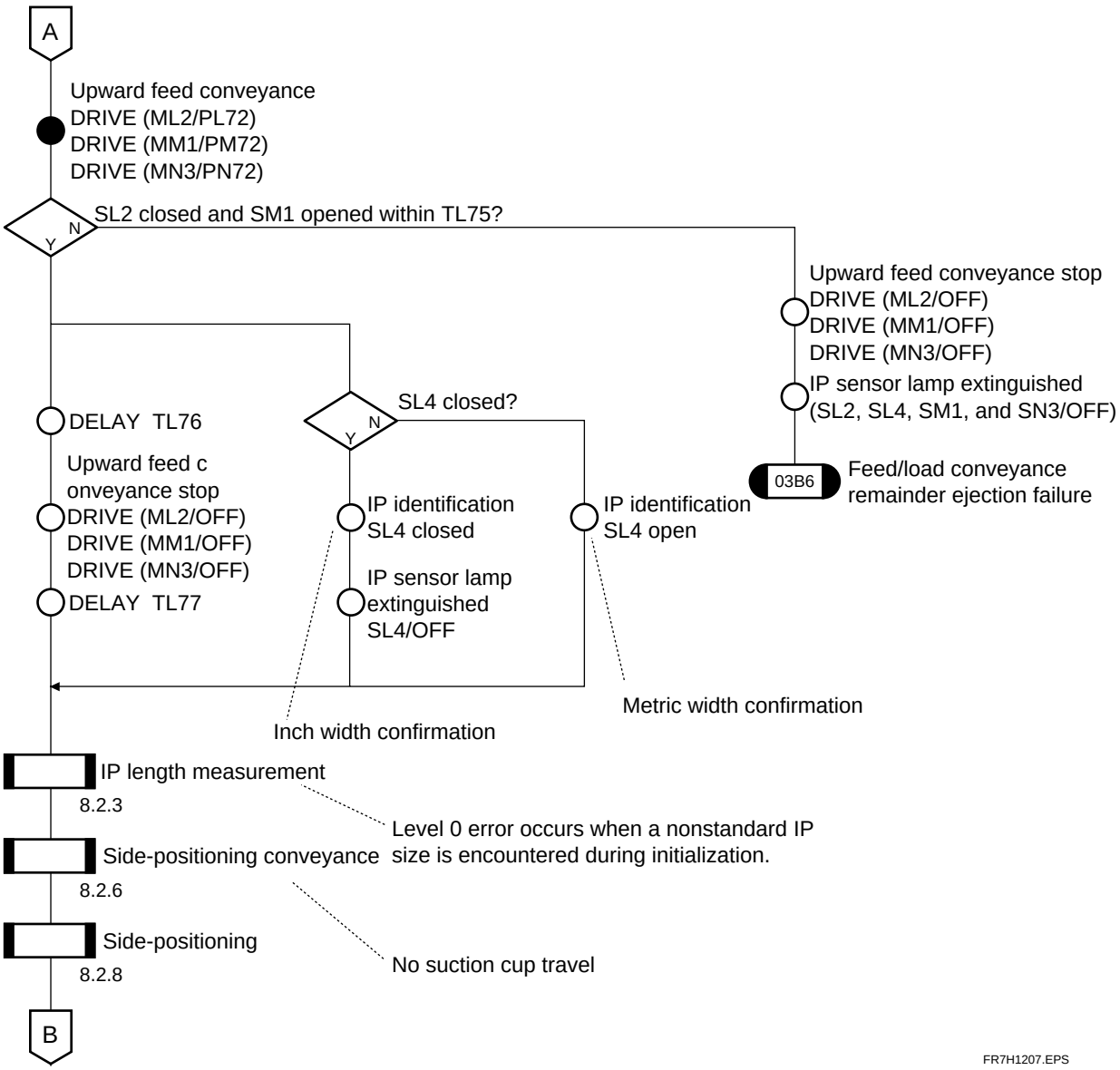


Table 8.5.10.1 Operation Parameter

Symbol	Description	Value
TK16	Wait for cassette insertion	0.1 sec

TR7H1186.EPS



FR7H1207.EPS

Table 8.5.10.2 Operation Parameters

Symbol	Description	Value
PM72	Initialization conveyance (upward)	0x7FFFFF
PN23	Conveyor grip (return to HP)	CW 400 P
PN72	Initialization conveyance (upward)	0x7FFFFF
TL74	Loading remaining IP ejection timeout	7.6 sec
TL75	Before-reading standby remaining IP ejection timeout	14.5 sec
TL76	Wait for width detection	0.5 sec
TL77	Wait for feed switchback operation	0.5 sec

0x7FFFFF: Infinitely CW

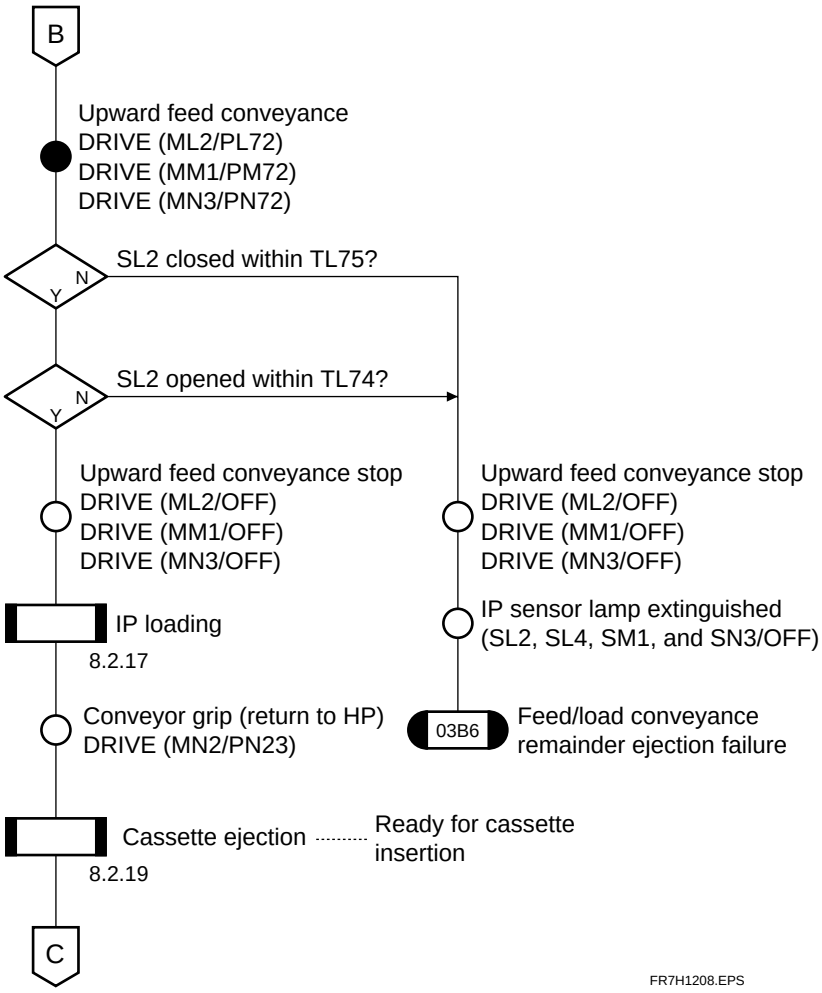
TR7H1187.EPS

Table 8.5.10.3 Operation Parameter

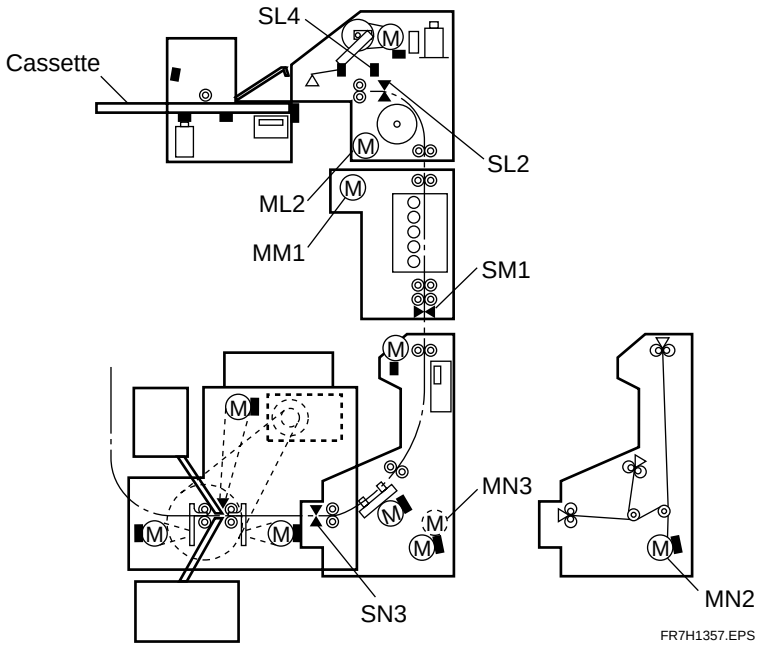
Symbol	Description	Mode	Value
PL72	Initialization conveyance (upward)	ST	0x7FFFFF
		HR (nonstandard IPs included)	0x7FFFFF

0x7FFFFF: Infinitely CW
Unit: P

TR7H1230.EPS


B
Upward feed conveyance
DRIVE (ML2/PL72)
DRIVE (MM1/PM72)
DRIVE (MN3/PN72)
SL2 closed within TL75?
N
Y
SL2 opened within TL74?
N
Y
Upward feed conveyance stop
DRIVE (ML2/OFF)
DRIVE (MM1/OFF)
DRIVE (MN3/OFF)
IP loading
8.2.17
Conveyor grip (return to HP)
DRIVE (MN2/PN23)
Cassette ejection
8.2.19
Ready for cassette insertion
C
Upward feed conveyance stop
DRIVE (ML2/OFF)
DRIVE (MM1/OFF)
DRIVE (MN3/OFF)
IP sensor lamp extinguished
(SL2, SL4, SM1, and SN3/OFF)
03B6
Feed/load conveyance
remainder ejection failure
FR7H1208.EPS

<I/O arrangement diagram>



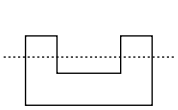
<I/O list>

Symbol	Name	Type	Function/remarks
ML2	IP transport motor	Pulse motor	Conveys the IP.
MM1	IP transport motor	Pulse motor	Conveys the IP.
MN2	Grip release motor	Pulse motor	Grips/releases a roller.
MN3	IP transport motor	Pulse motor	Conveys the IP.
SK2	Cassette IN sensor	Microswitch	The state of this sensor is ANDed with that of the SK3 to achieve recognition.
SL2	Cassette opening IP sensor	PI (19 mm)	IP transport sensor.
SL4	Inch/metric sensor	Reflection type	Determines the IP width.
SM1	Before-BCR IP sensor	PI (19 mm)	IP transport sensor.
SN3	Side-positioning IP sensor	PI (19 mm)	IP transport sensor.
LEDU1	Cassette insertion indicator	LED	Indicates that the machine is ready for cassette insertion.

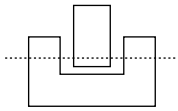
TR7H1121.EPS

<Sensor ON/OFF status>

SL2/SM1/SN3

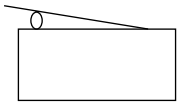


OFF: Open (IP not found)



ON: Closed (IP found)

SK2

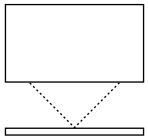


OFF: Open

ON: Closed

SL4

OFF (0): Open

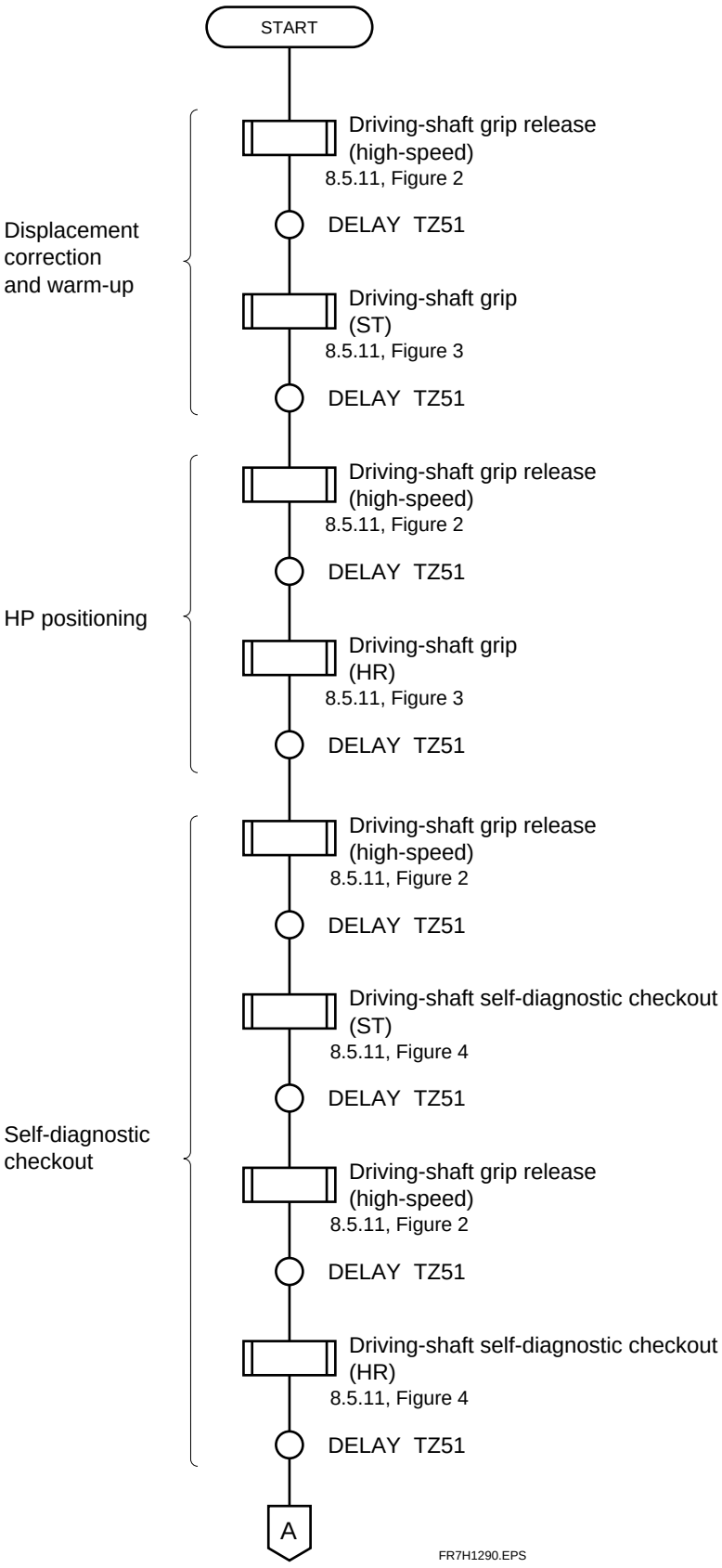


ON (1): Closed

FR7H1327.EPS

8.5.11 Subscanning grip HP positioning

<Figure 1 Subscanning grip HP positioning flowchart>



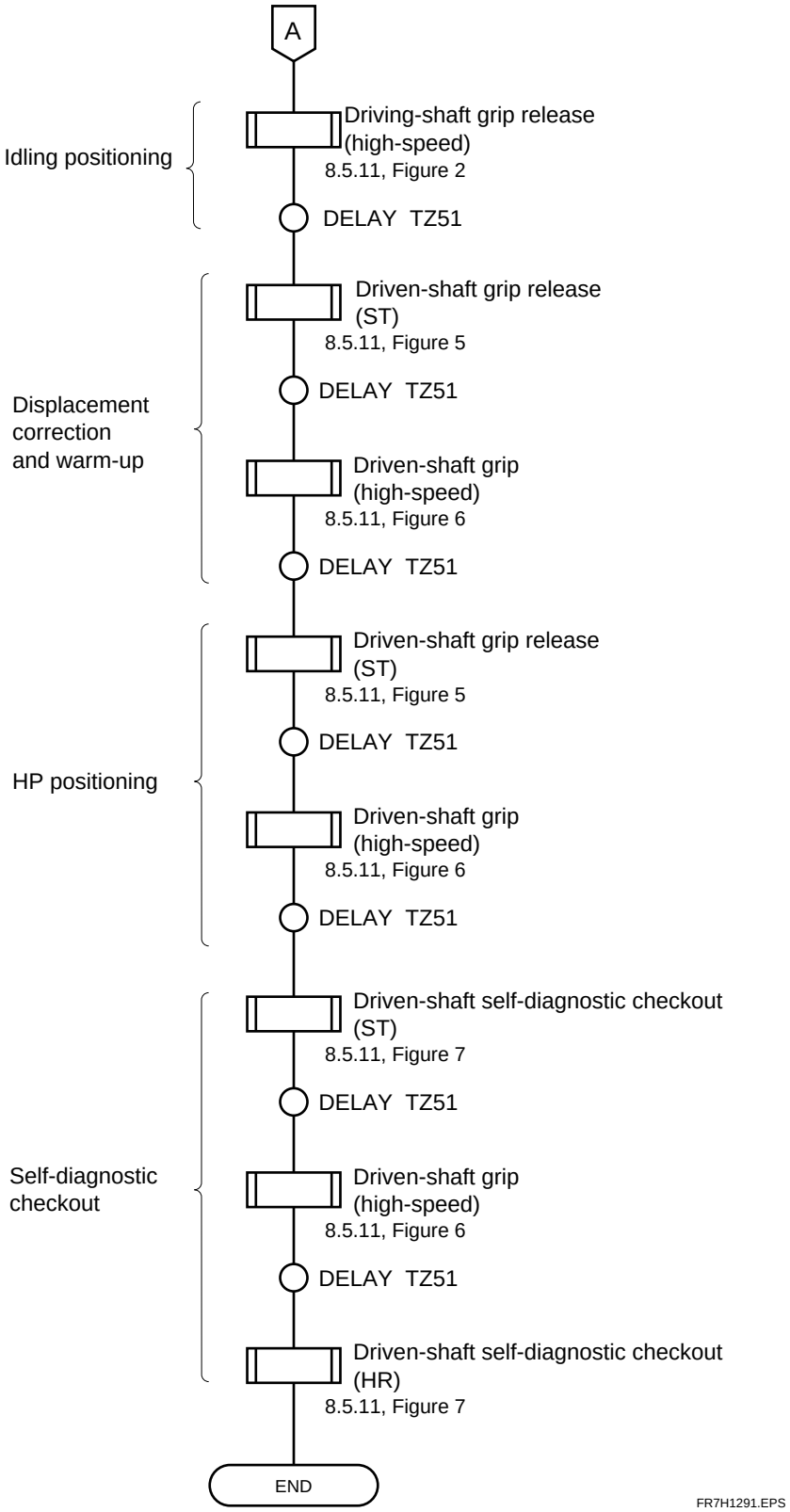
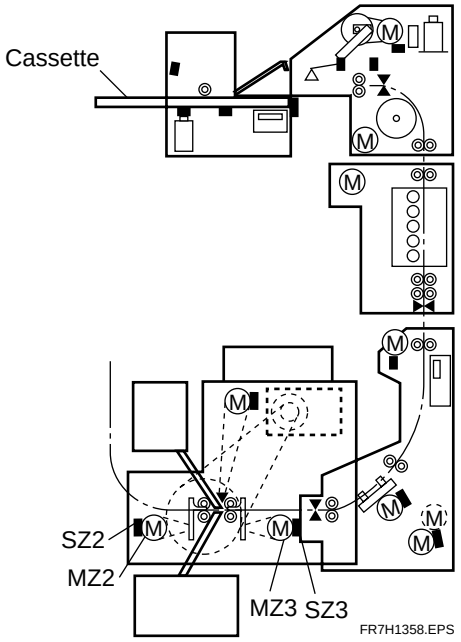


Table 8.5.11.1 Operation Parameter

Symbol	Description	Value
TZ51	Wait for initialization grip operation	0.5 sec

TR7H1188.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
MZ2	Driving-shaft grip motor	DC motor	Grips/releases the driving shaft.
MZ3	Driven-shaft grip motor	DC motor	Grips/releases the driven shaft.
SZ2	Driving-side grip release HP sensor	PI (5 mm)	Detects the driving-side grip release HP.
SZ3	Driven-side grip release HP sensor	PI (5 mm)	Detects the driven-side grip release HP.

TR7H1122.EPS

<Sensor ON/OFF status>

SZ2/SZ3

OFF: Open (not blocked)

ON: Closed (blocked)

FR7H1328.EPS

<Figure 2 Driving-shaft grip release flowchart>

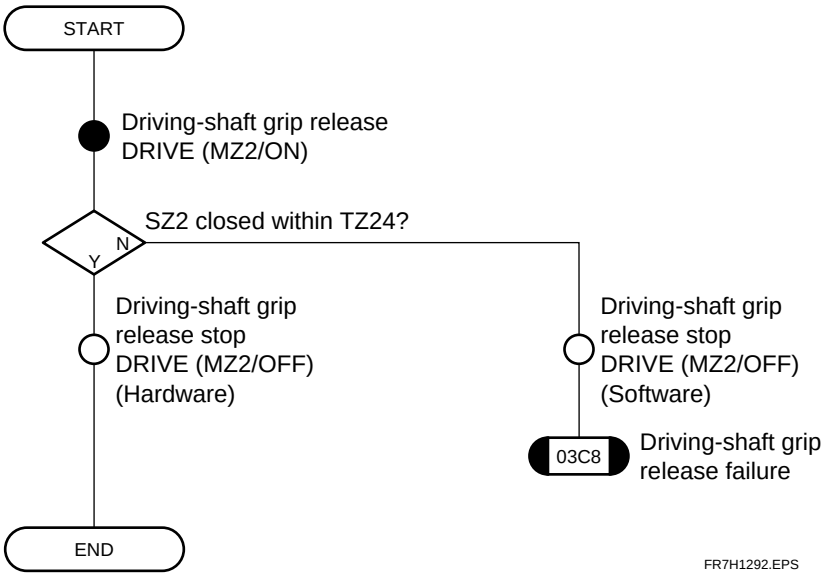


Table 8.5.11.2 Operation Parameter

Symbol	Description	Mode	Value
TZ24	Driving-shaft grip release timeout	ST	3.0
		HR	8.5

Unit: sec TR7H1189.EPS

<Figure 3 Driving-shaft grip flowchart>

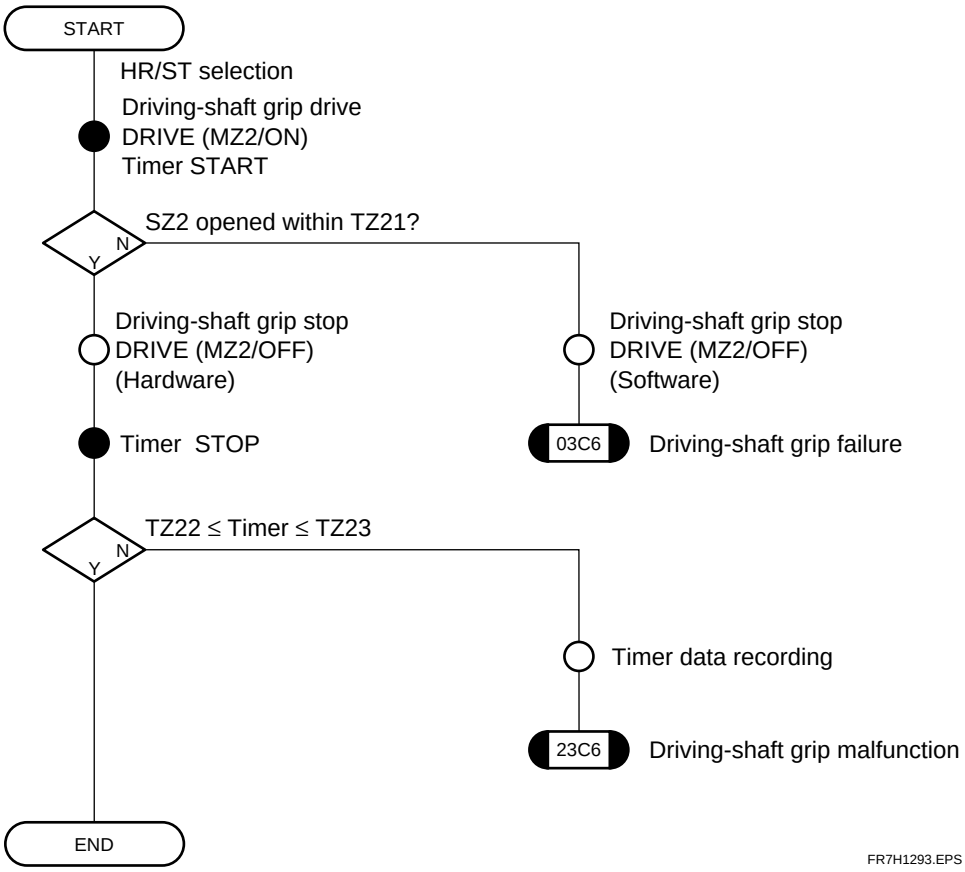


Table 8.5.11.3 Operation Parameter

Symbol	Description	Value
TZ51	Wait for initialization grip operation	0.5 sec

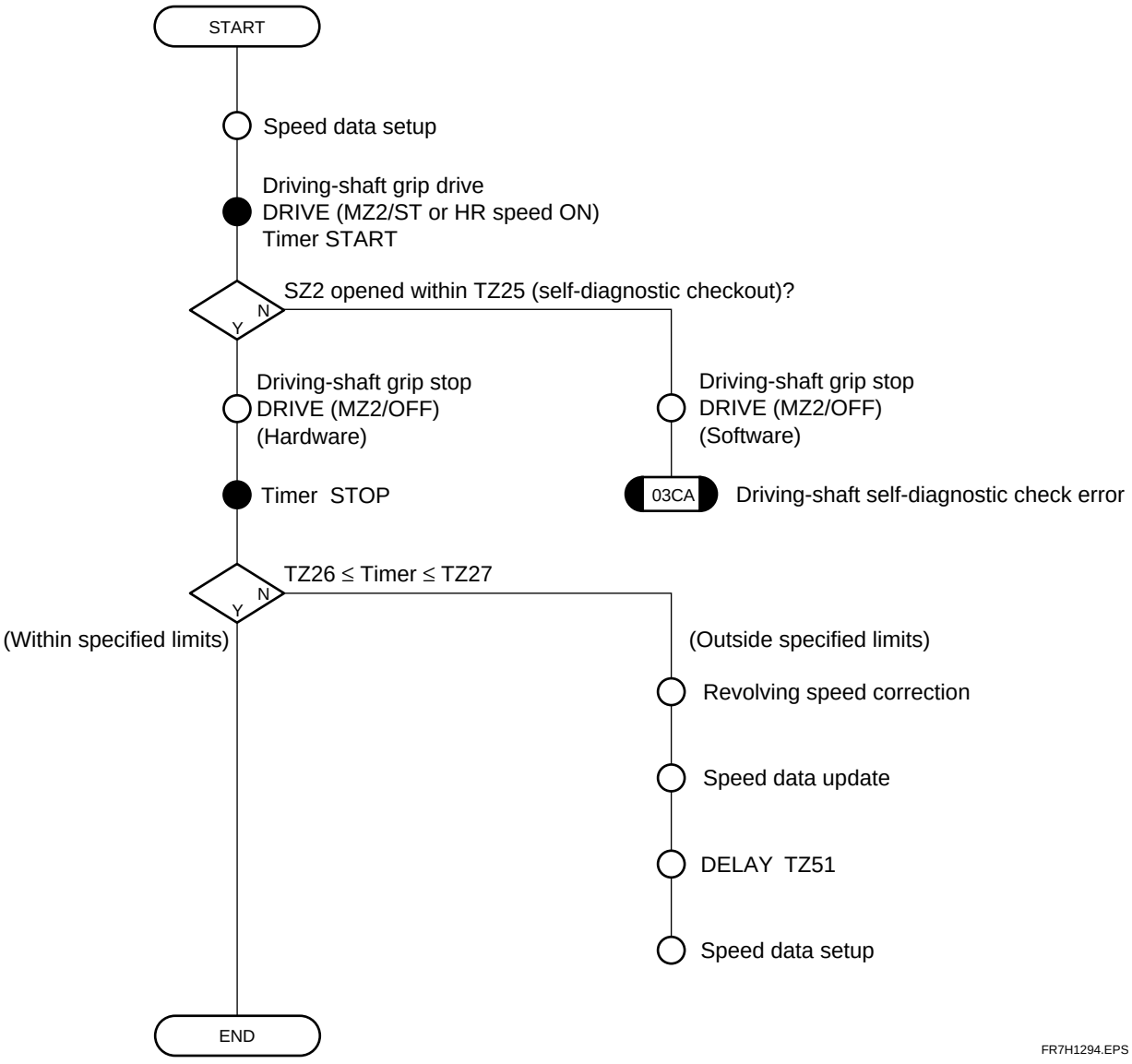
TR7H1190.EPS

Table 8.5.11.4 Operation Parameters

Symbol	Description	Mode	Value
TZ21	Driving-shaft grip timeout	ST	7.6
		HR	15.3
TZ22	Driving-shaft grip specified lower limit	ST	2.7
		HR	5.3
TZ23	Driving-shaft grip specified upper limit	ST	5.0
		HR	9.9
TZ25	Driving-shaft grip timeout (self-diagnostic checkout)	ST	9.8
		HR	19.4
TZ26	Driving-shaft grip specified lower limit (self-diagnostic checkout)	ST	3.72
		HR	7.54
TZ27	Driving-shaft grip specified upper limit (self-diagnostic checkout)	ST	3.92
		HR	7.74

Unit: sec TR7H1231.EPS

<Figure 4 Driving-shaft self-diagnostic checkout flowchart>



<Figure 5 Driven-shaft grip release flowchart>

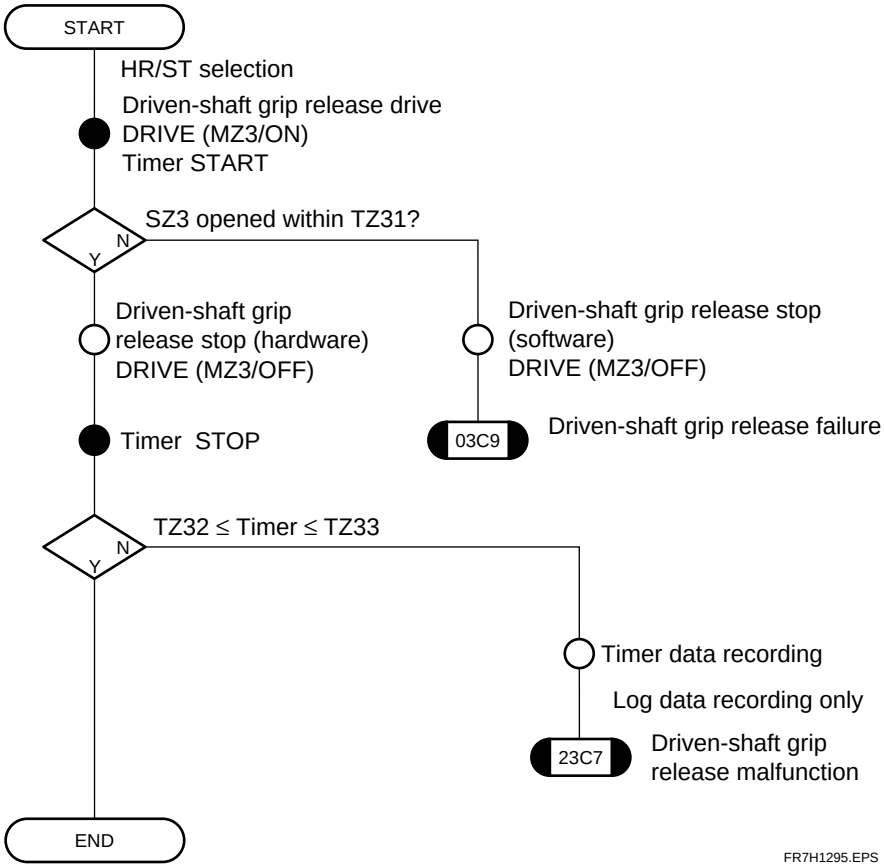
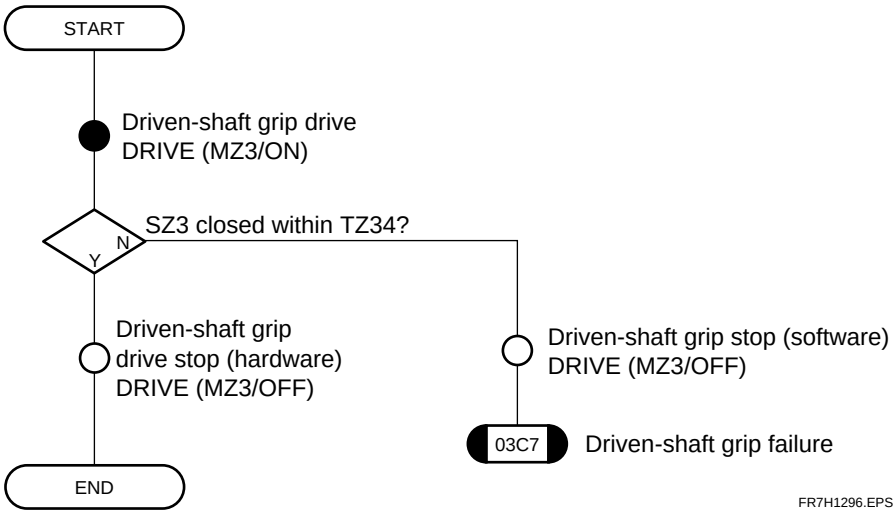


Table 8.5.11.5 Operation Parameters

Symbol	Description	Mode	Value
TZ31	Driven-shaft grip release timeout	ST	6.2
		HR	12.4
TZ32	Driven-shaft grip release specified lower limit	ST	2.2
		HR	4.3
TZ33	Driven-shaft grip release specified upper limit	ST	4.0
		HR	8.1
TZ34	Driven-shaft grip timeout	High-speed	1.9
		HR	7.0

Unit: sec TR7H1191.EPS

<Figure 6 Driven-shaft grip flowchart>



<Figure 7 Driven-shaft self-diagnostic checkout flowchart>

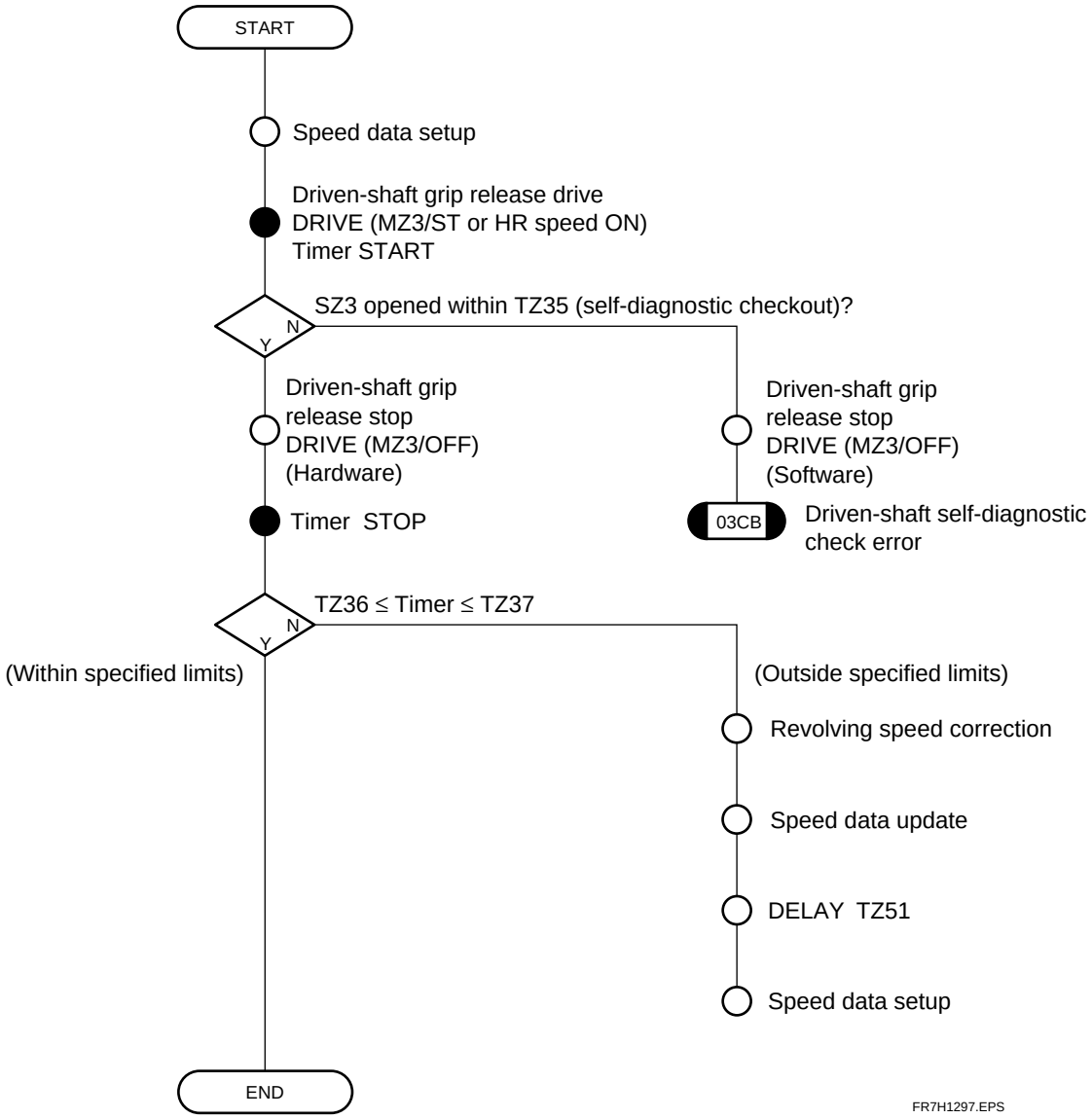


Table 8.5.11.6 Operation Parameter

Symbol	Description	Value
TZ51	Wait for initialization grip operation	1 sec

TR7H1192.EPS

Table 8.5.11.7 Operation Parameters

Symbol	Description	Mode	Value
TZ35	Driven-shaft grip timeout (self-diagnostic checkout)	ST	8.0
		HR	16.0
TZ36	Driven-shaft grip specified lower limit (self-diagnostic checkout)	ST	3.0
		HR	6.1
TZ37	Driven-shaft grip specified upper limit (self-diagnostic checkout)	ST	3.2
		HR	6.3

Unit: sec TR7H1232.EPS

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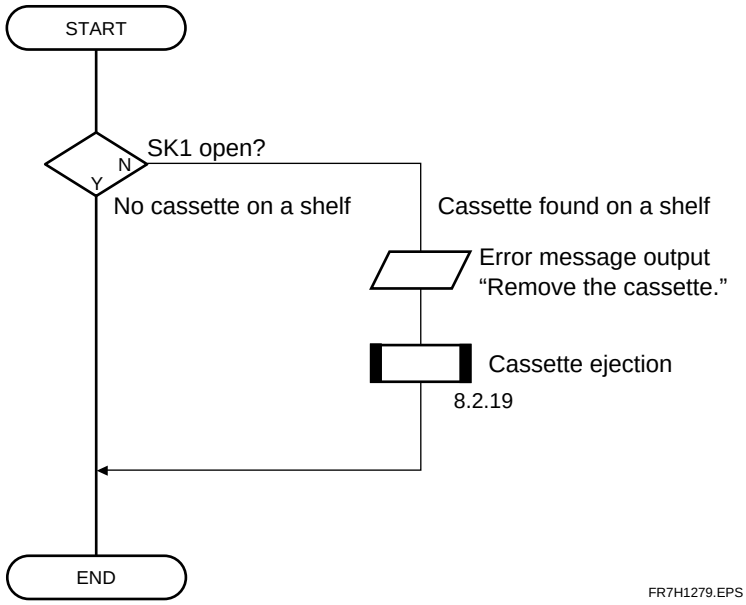
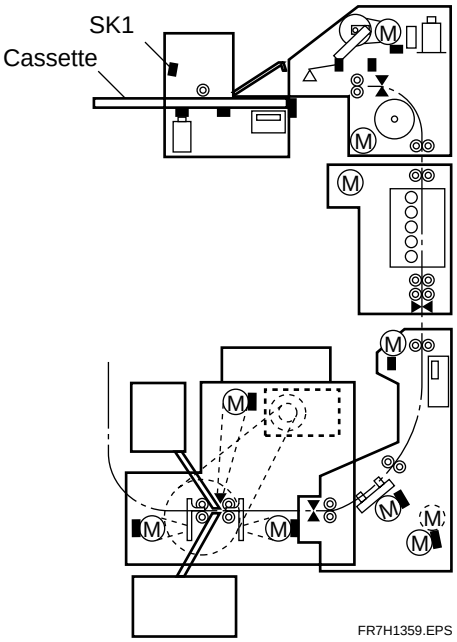
8.5.12 Empty cassette ejection

<Figure 1 Empty cassette ejection flowchart>



<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
SK1	Cassette ejection sensor	PI (5 mm)	Detects a cassette ejection.

TR7H1123.EPS

<Sensor ON/OFF status>

8.5.13 Mirror descent

<Figure 1 Mirror descent flowchart>

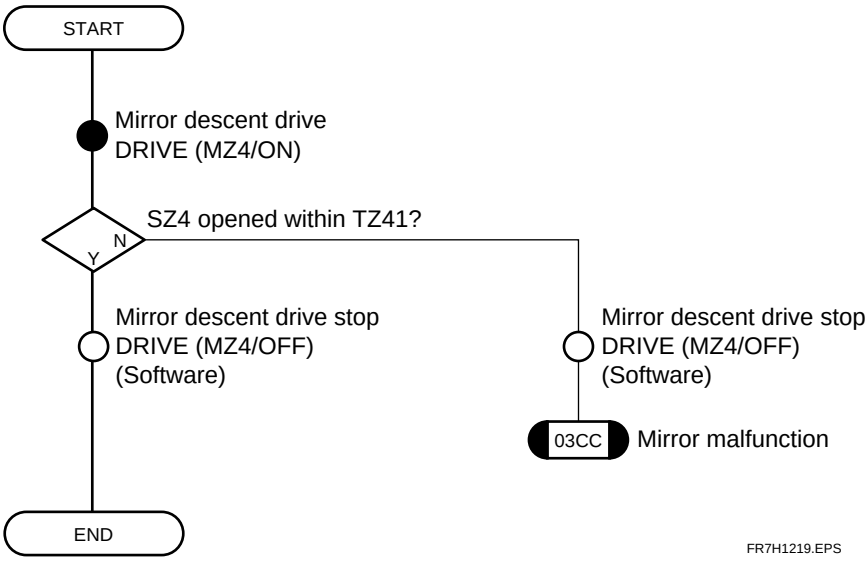
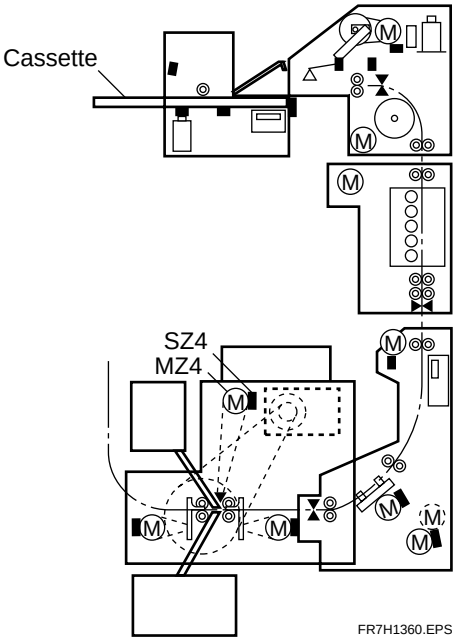


Table 8.5.13.1 Operation Parameter

Symbol	Description	Value
TZ41	Mirror descent timeout	1 sec

TR7H1193.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
MZ4	Mirror driving motor	DC motor	Moves the mirror up and down.
SZ4	Mirror HP sensor	PI (5 mm)	Detects the mirror HP.

TR7H1124.EPS

<Sensor ON/OFF status>

8.5.14 Initialization cassette hold release

<Figure 1 Initialization cassette hold release flowchart>

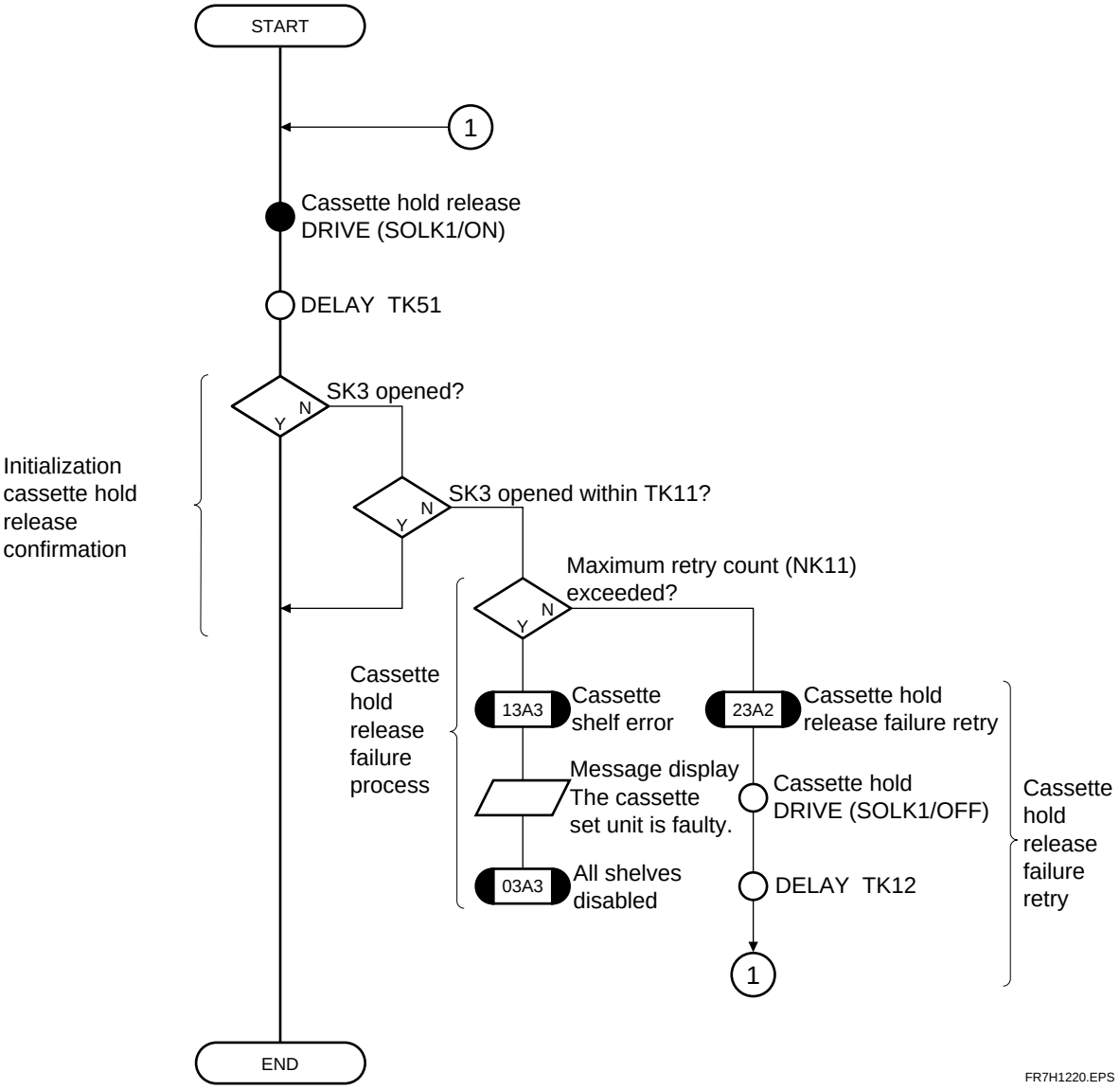
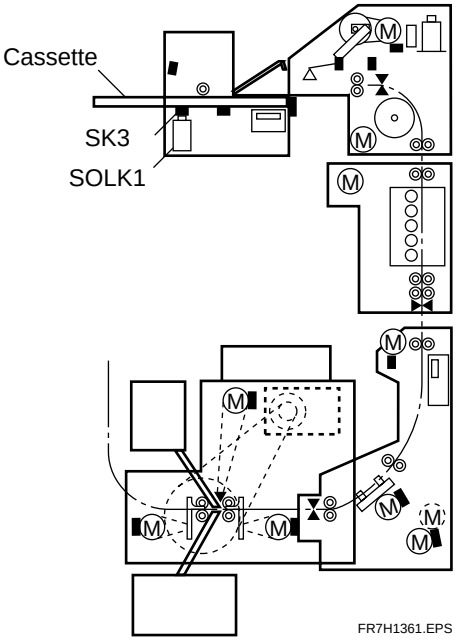


Table 8.5.14.1 Operation Parameters

Symbol	Description	Value
NK11	Hold release retry	5 times
TK11	Hold release timeout	0.5 sec
TK12	Wait for hold release retry	2 sec
TK51	Wait for initialization hold	0.5 sec

TR7H1194.EPS

<I/O arrangement diagram>



<I/O list>

Symbol	Name	Type	Function/remarks
SK3	Cassette hold sensor	PI (5 mm)	Actuates upon completion of a cassette hold operation.
SOLK1	Cassette hold solenoid	Power down solenoid	When turned ON, this solenoid retracts the cassette hold pin.

TR7H1125.EPS

<Sensor ON/OFF status>

SK3

OFF: Open (not blocked)

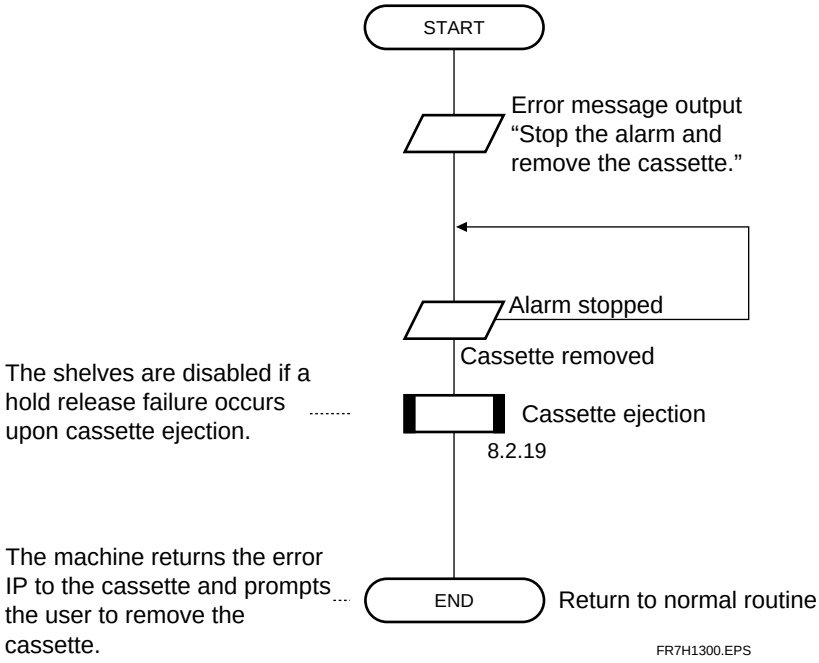
ON: Closed (blocked)

FR7H1331.EPS

8.6 Abnormality Process Flowcharts

8.6.1 Abnormality process (cassette ejection 1)

<Figure 1 Abnormality process (cassette ejection 1) flowchart>


START
Error message output
“Stop the alarm and
remove the cassette.”
Alarm stopped
Cassette removed
The shelves are disabled if a hold release failure occurs upon cassette ejection.
Cassette ejection
8.2.19
The machine returns the error IP to the cassette and prompts the user to remove the cassette.
END
Return to normal routine
FR7H1300.EPS

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8.6.2 Abnormality process (cassette ejection 2)

<Figure 1 Abnormality process (cassette ejection 2) flowchart>

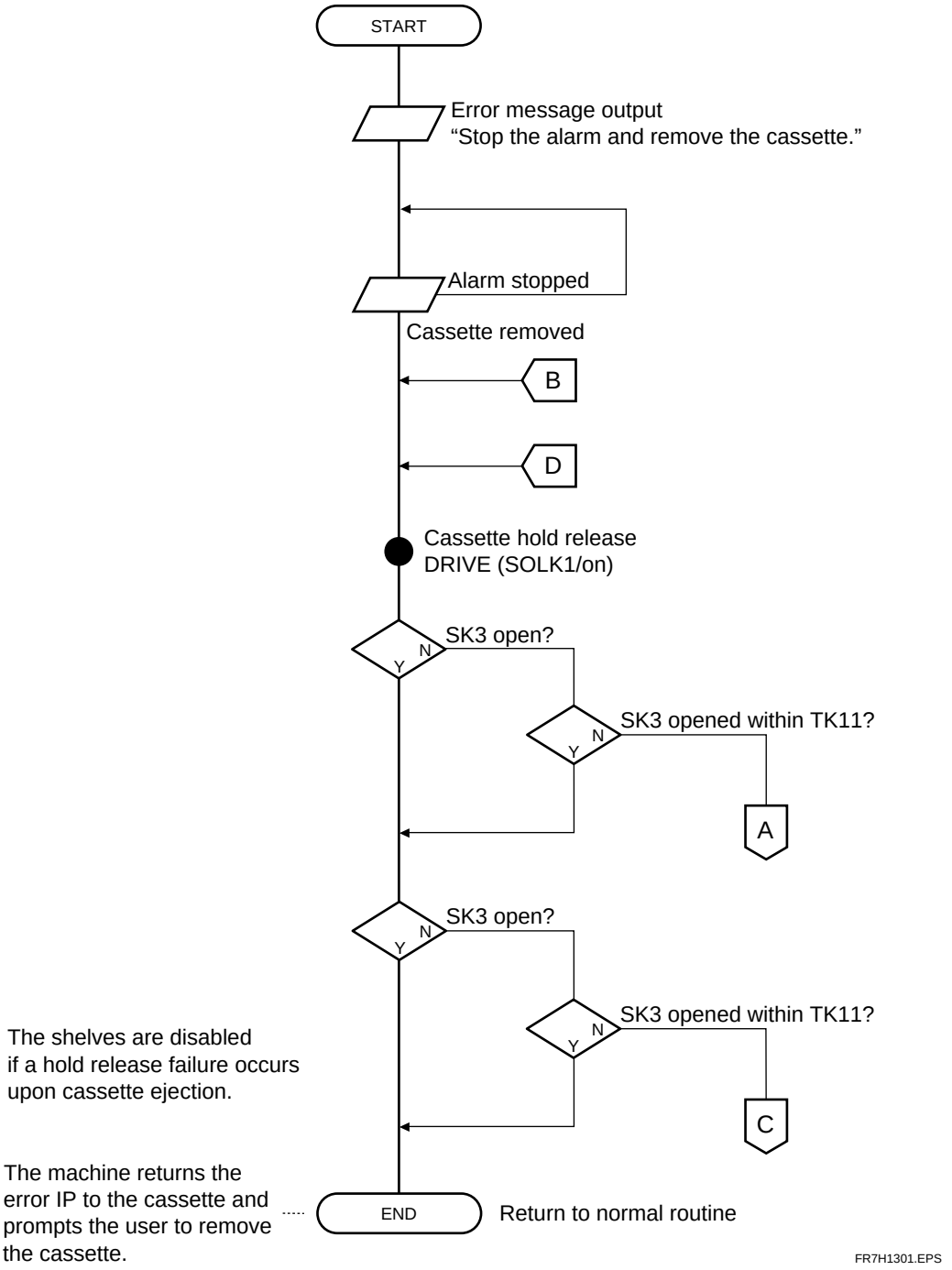
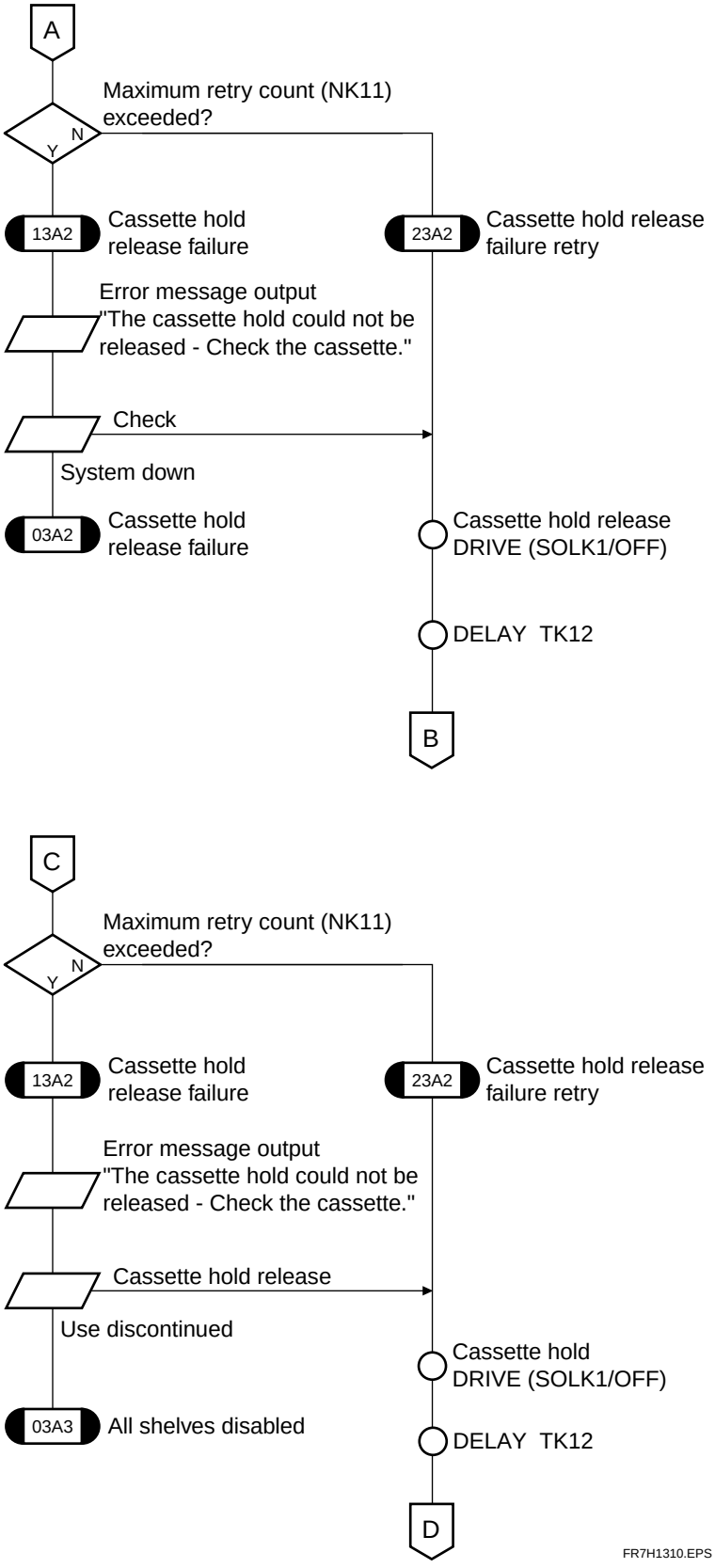


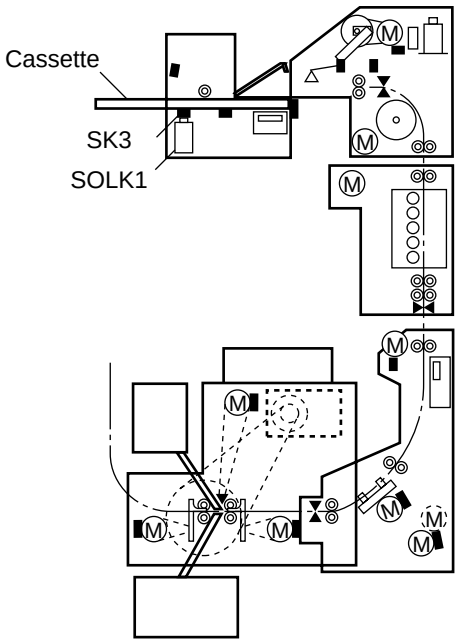
Table 8.6.2.1 Operation Parameters

Symbol	Description	Value
NK11	Hold release retry	5 times
TK11	Hold release timeout	0.5 sec
TK12	Wait for hold release retry	2 sec

TR7H1201.EPS


A
Maximum retry count (NK11) exceeded?
N
Y
13A2
Cassette hold release failure
23A2
Cassette hold release failure retry
Error message output "The cassette hold could not be released - Check the cassette."
Check
System down
03A2
Cassette hold release failure
Cassette hold release DRIVE (SOLK1/OFF)
DELAY TK12
B
C
Maximum retry count (NK11) exceeded?
N
Y
13A2
Cassette hold release failure
23A2
Cassette hold release failure retry
Error message output "The cassette hold could not be released - Check the cassette."
Cassette hold release
Use discontinued
03A3
All shelves disabled
Cassette hold DRIVE (SOLK1/OFF)
DELAY TK12
D
FR7H1310.EPS

<I/O arrangement diagram>



FR7H1365.EPS

<I/O list>

Symbol	Name	Type	Function/remarks
SK3	Cassette hold sensor	PI (5 mm)	Actuates upon completion of a cassette hold operation.
SOLK1	Cassette hold solenoid	Power down solenoid	When turned ON, this solenoid retracts the cassette hold pin.

TR7H1129.EPS

<Sensor ON/OFF status>

FR7H1334.EPS

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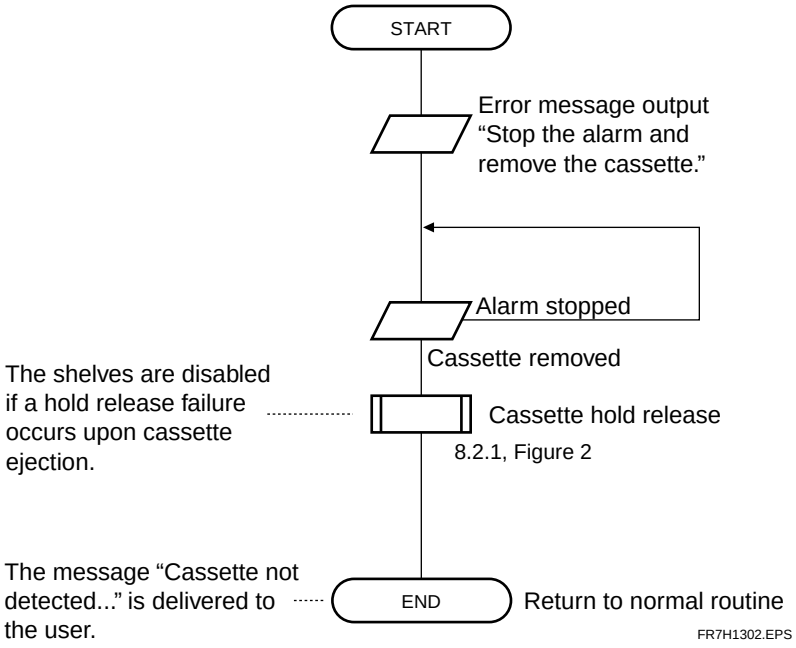
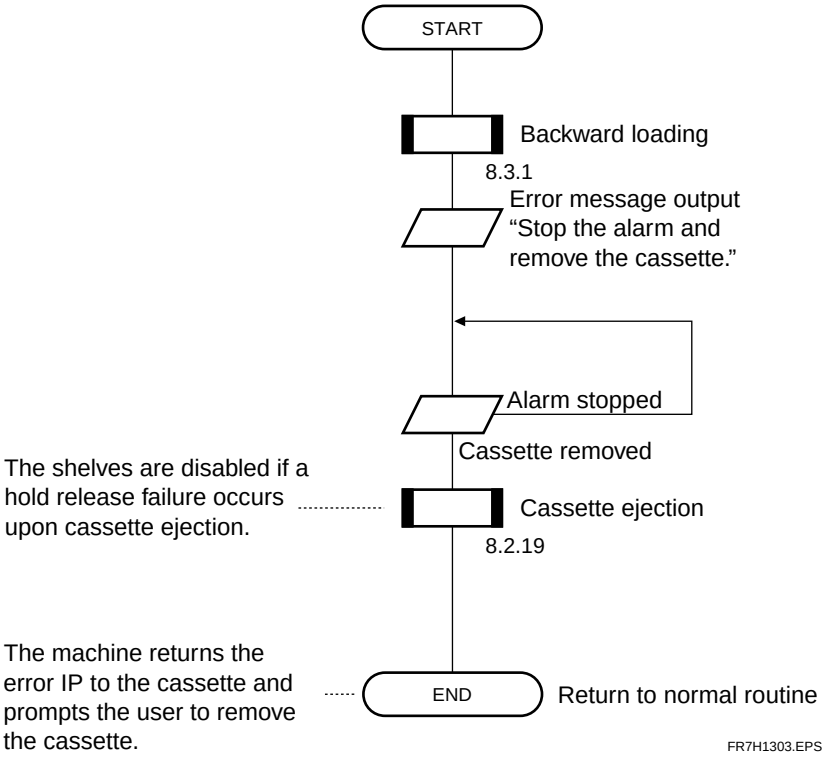
8.6.3 Abnormality process (cassette not detected)

<Figure 1 Abnormality process (cassette not detected) flowchart>



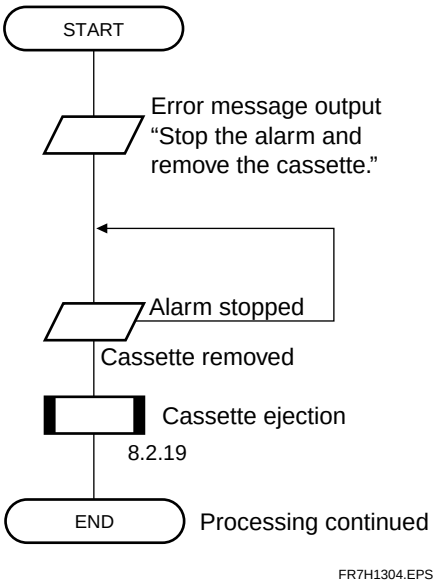
8.6.4 Abnormality process (recovered IP loading)

<Figure 1 Abnormality process (recovered IP loading) flowchart>



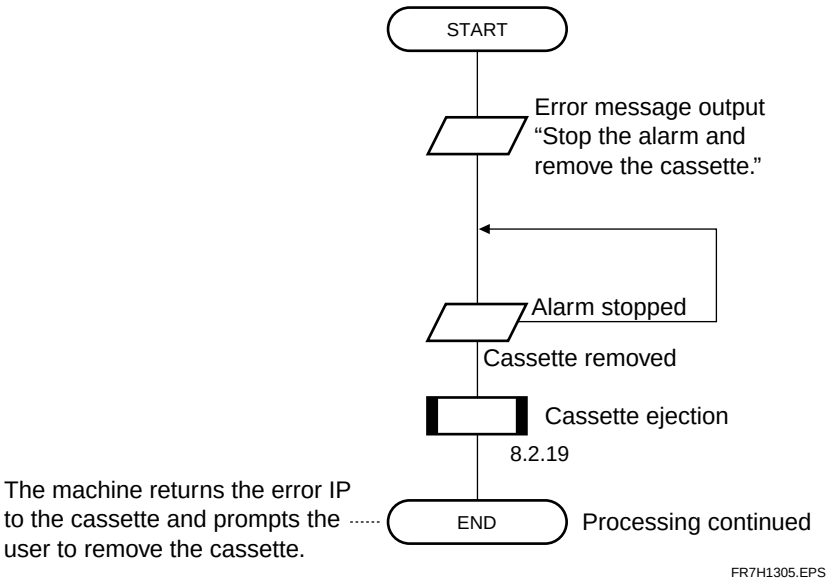
8.6.5 Abnormality process (high dose)

<Figure 1 Abnormality process (high dose) flowchart>



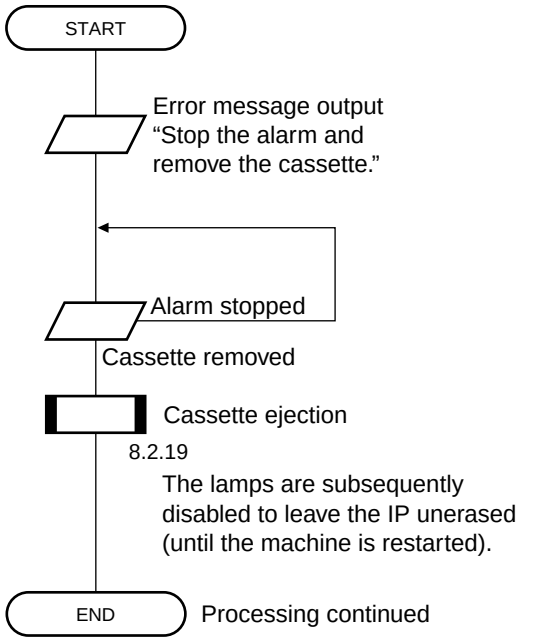
8.6.6 Abnormality process (IP generation/type mismatch detection)

<Figure 1 Abnormality process (IP generation/type mismatch detection) flowchart>



8.6.7 Abnormality process (lamp failure)

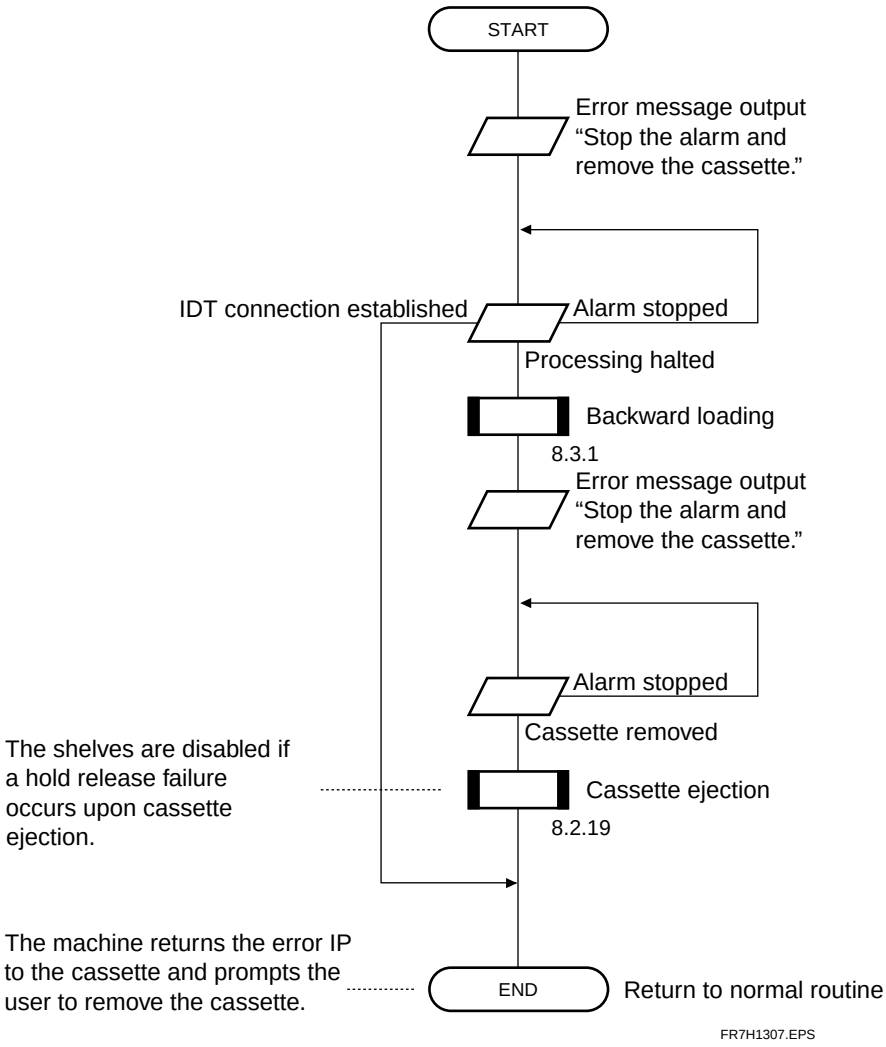
<Figure 1 Abnormality process (lamp failure) flowchart>



FR7H1306.EPS

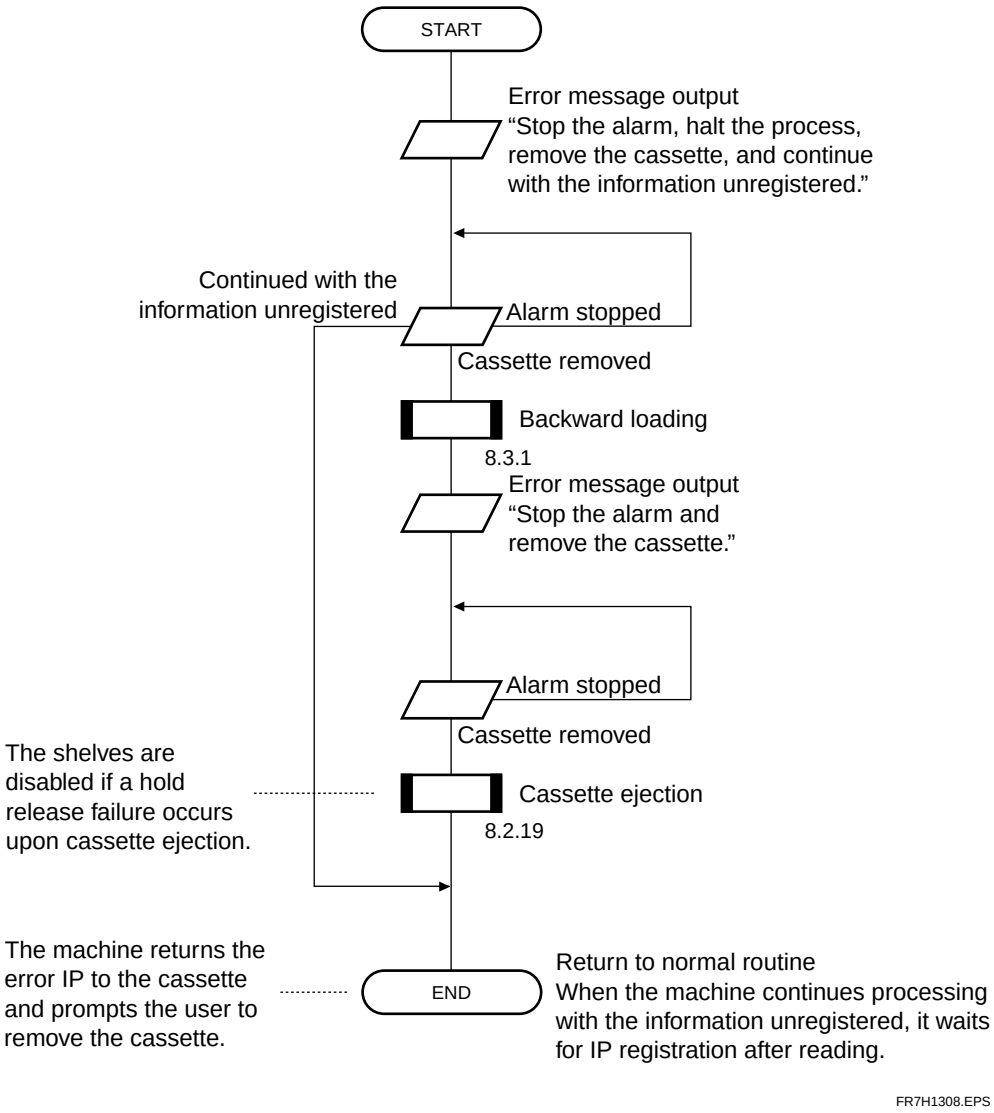
8.6.8 Abnormality process (IDT line failure)

<Figure 1 Abnormality process (IDT line failure) flowchart>



8.6.9 Abnormality process (ID information not registered)

<Figure 1 Abnormality process (ID information not registered) flowchart>


START
Error message output
“Stop the alarm, halt the process, remove the cassette, and continue with the information unregistered.”
Continued with the information unregistered
Alarm stopped
Cassette removed
Backward loading
8.3.1
Error message output
“Stop the alarm and remove the cassette.”
Alarm stopped
Cassette removed
The shelves are disabled if a hold release failure occurs upon cassette ejection.
Cassette ejection
8.2.19
The machine returns the error IP to the cassette and prompts the user to remove the cassette.
END
Return to normal routine
When the machine continues processing with the information unregistered, it waits for IP registration after reading.

FR7H1308.EPS

Table 8.6.9.1 Operation Parameters

Symbol	Description	Value
PN11	Side-positioning (HP → stopper)	CW 64 P
PN16	Side-positioning (stopper → HP)	CCW 64 P
PN23	Conveyor grip (return to HP)	CW 400 P
TM31	Wait for BCR retry	0.5 sec

TR7H1202.EPS

Table 8.6.9.2 Operation Parameter

Symbol	Description	14" x 17"	14" x 14"	10" x 12"	8" x 10"	1824ST	2430ST	1824HR	2430HR
PN33	Conveyance (backing to BCR)	204	1752	2792	4870	5338	2894	5338	4116

Unit: P
Direction of rotation: CW for positive values or CCW for negative values

TR7H1233.EPS

8.6.10 Abnormality process (BCR retry)

<Figure 1 Abnormality process (BCR retry) flowchart>